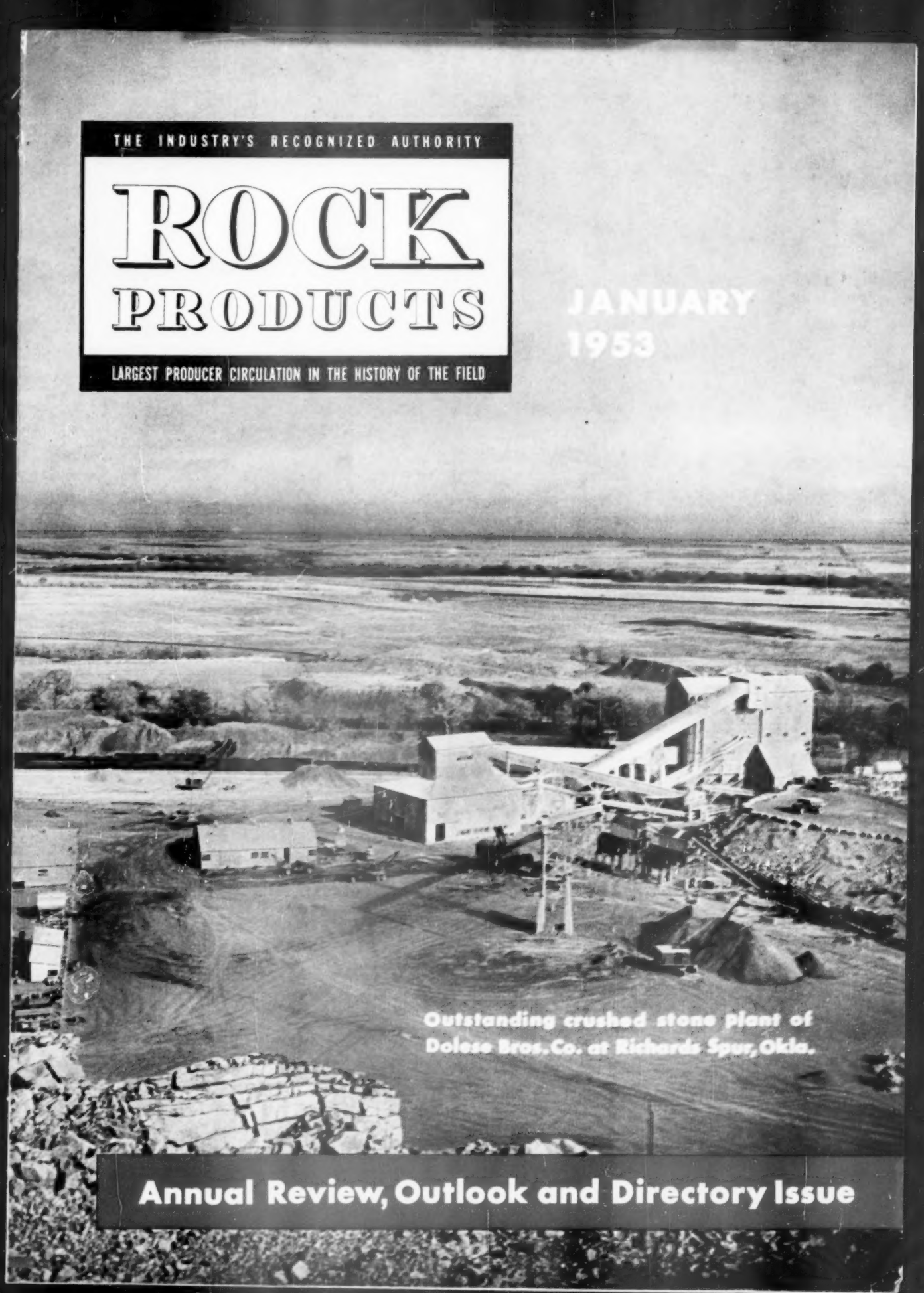
THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

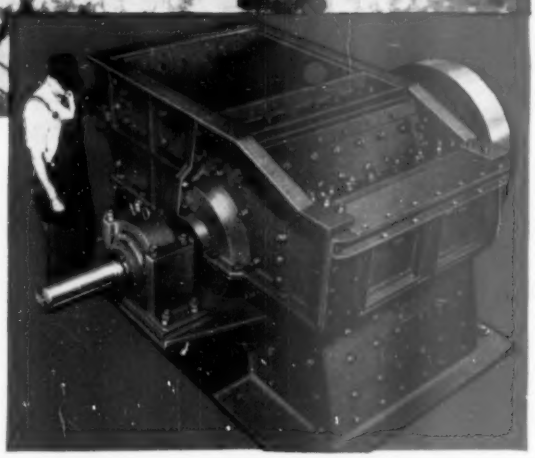
LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

JANUARY
1953



Outstanding crushed stone plant of Dolese Bros. Co. at Richards Spur, Okla.

Annual Review, Outlook and Directory Issue



. . . for WILLIAMS SUPER-SLUGGER CRUSHER reducing power shovel stone to 2" or smaller in ONE OPERATION

The Super-Slugger is designed for big reduction jobs, either as regards size of feed or hourly output.

Generally one Super-Slugger will do the work of a primary and several secondary reduction units, eliminating connecting conveyors and additional foundations, drives, etc.

Material is reduced by the Williams Hammer Principle with heavy hammers crushing the material by impact until of proper size to pass through the grate or cage. Eight standard sizes available.

WC51-7

WILLIAMS PATENT CRUSHER AND PULVERIZER CO.
800 St. Louis Avenue. St. Louis 6, Missouri

WILLIAMS ALSO MAKES:

Heavy-duty hammer mills in smaller sizes for all quarry operations; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "package" crushing and grinding plants.

WILLIAMS

CRUSHERS GRINDERS SHREDDERS

OLDEST AND LARGEST BUILDERS OF HAMMER MILLS IN THE WORLD

No ONE chain serves every purpose

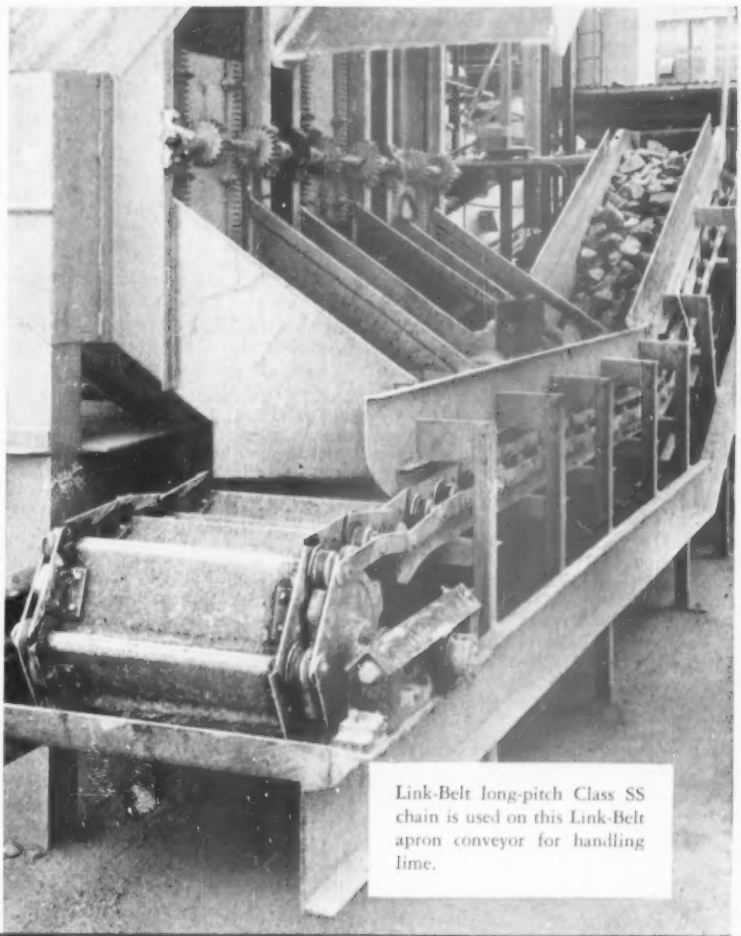
LINK-BELT offers a SPECIFIC chain

. . . to match your SPECIALIZED needs

There's just *one* type of chain that *best* meets the requirements of any given job. And no "general purpose" chain can do it as well. From our complete chain line, Link-Belt engineers can recommend the *right* chain for your requirements. There's no necessity to fit your needs to a limited line.

Get longer life!

Remember, too — when you see a chain with the Link-Belt trade-mark, you can be sure it's made to the highest standards. Link-Belt's modern plant facilities assure greater refinements of manufacture. Accurate control of materials and processes give increased uniformity . . . longer chain life.



Link-Belt long-pitch Class SS chain is used on this Link-Belt apron conveyor for handling lime.

TYPICAL CHAINS from the COMPLETE LINK-BELT line

Class SS bushed roller chain with offset sidebars —for heavy drive service at moderate speeds.

Class SS bushed roller chain with straight sidebars —for practically any conveying or elevating service.

Class 800 lev bushed chain—for heavy duty, severely abrasive conveying and elevating.

Class C combination chain—popular, durable, low cost design for elevators, conveyors.

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ROCK PRODUCTS

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Bror Nordberg
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Nathan C. Rockwood
Editorial Consultant

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To Subscribers—Date on wrapper indicates issue with which your subscription expires. . . In writing to have address changed, give old as well as new address.

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Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

". . . within a few days ordinary belts had stretched . . . After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all . . ."

"Ordinary belts lasted only 5 or 6 weeks . . . B. F. Goodrich grommet belts are in their sixth month of service . . ."

"Previous belts suffered from shock loads, wore out fast . . . BFG grommet belts have been in service 2 years with no shut-downs . . ."

There are hundreds of cases like these.

They cost no more

BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V-Belts BY

B.F.Goodrich

FIRST IN RUBBER

The B. F. Goodrich Company
Dept. RP-1
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

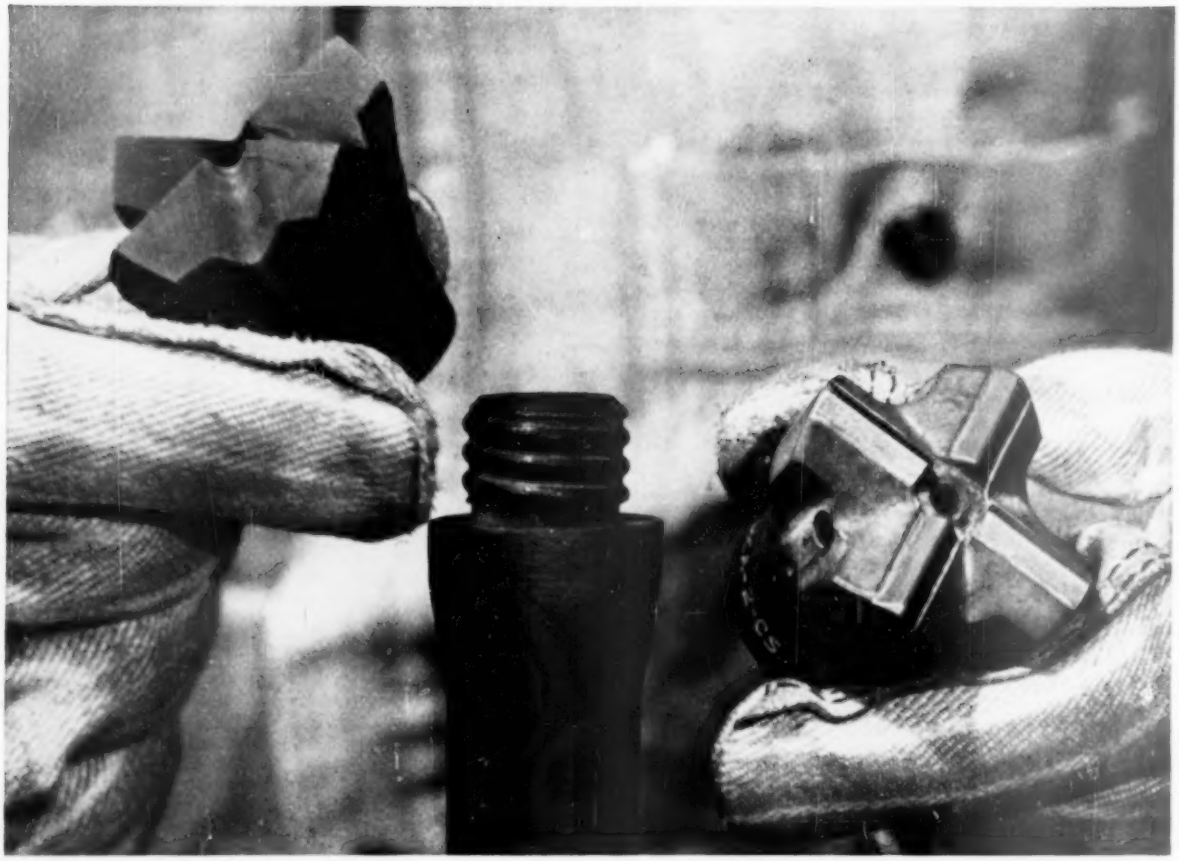
_____

Street Address_____

City_____

State_____

NO NEED TO SWITCH STEELS WHEN YOU NEED TO SWITCH BIT TYPES!



Both Timken® bit types fit the same steel!

YOU don't need to switch steels, or stock more than one kind, when you use Timken® interchangeable rock bits. Timken multi-use and carbide insert bits both fit the same threaded drill steel so that you can change quickly to the most economical bit as the ground changes. And you can do it right on the job!

In ordinary ground, when full increments of steel can be drilled, Timken multi-use bits, with correct and controlled reconditioning, will give you the lowest cost per foot of hole.

If you hit hard and abrasive ground, you can switch quickly to Timken carbide insert bits. They're your best bet for maximum speed drilling, constant-gage holes, small diameter blast holes and very deep holes.

Be sure to have both types of Timken bits on hand and you'll have the best answer to every one of your drilling problems.

Timken multi-use and carbide insert bits are interchangeable in each thread series. And both types have these three important advantages: (1) made from electric furnace Timken fine alloy steel, (2) threads are not subject to drilling impact because of the special shoulder union developed by the Timken Company, (3) quickly and easily changed.

Timken rock bit engineers have 20 years' experience in solving drilling problems. Let them help you select the best bits for *your* job. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN

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your best bet for the best bit
. . . for <u>every</u> job

NORTHWEST meets the ROCK TEST!

for WESTERN LIME and CEMENT COMPANY, MILWAUKEE, WIS.

HERE'S a job that would test the mettle of any equipment. Greater crowding force, smoothness of dipper control, easier operation, accuracy of spotting, are just a few of the advantages that Northwest equipment brings you. They are advantages that show up in all hard rock work. Northwests are serving on some of the largest quarrying operations in the country. In many cases their speed is outproducing larger, slower equipment and their simplicity of design and dependable construction eliminates the constant irritation of minor adjustments and breakdowns that increase down time and reduce output.

The Northwest is a *real* Rock Shovel and if you have a *real* Rock Shovel you are equipped for any pit problem. Why not plan to have a Northwest? Talk it over with a Northwest Man.

NORTHWEST ENGINEERING COMPANY
135 South LaSalle Street, Chicago 3, Ill.

ROCK is this Company's Business!

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

Replaces 7 trucks with 2 Tournarockers on tough coal stripping job

Operator Dayley Collett flips "dump" button, drops Tournarocker load clean over bank. Reports Collett, "What I like most is the easy way Tournarockers handle. They turn around with plenty of room to spare."

With heaped load, Tournarocker starts 300′ haul to fill. Rig's ability to turn 90° in 13′9″ radius speeds cycle. Says Owner Chapman: "One feature we particularly like about these machines is the way we can turn them around without stopping in our narrow cuts."

H. T. Chapman **of Elkins, West Virginia — stripping 1,500,000 yds. of shale for the Phil Williams Coal Co. near Elkins — has a serious haul problem on his hands. During much of the year working conditions are very bad. Steady rains, combined with poor drainage, continually saturate haul roads and material. At times, parts of the haul must be made through 30″ of water. Access roads are wet, spongy, and practically bottomless in places.**

"Only equipment that can do job"

When it became apparent that dump trucks couldn't work efficiently under these conditions, Chapman tried 2 rear-dump C Tournarockers. With their traction advantages—front-wheel drive, big high-flotation tires and power-proportioning differential (which automatically applies up to 4 times the power of slipping drive-wheel to wheel on firmer ground) — these rigs really did the trick! After several months' use Chapman observed, "Tournarockers are the only pieces of equipment that could do the job. My 2 'C's' have replaced 7 trucks!"

Move 220 yds. of overburden hourly

Company records covering several typical months of stripping show the 2 Tournarockers average 11 cu. yds. (almost 15 tons) of hard blue shale per load. On a soupy 600′ cycle, each rig makes 10 trips per hour . . . hauls 1100 yds. (1500 tons) per 10-hour day.

Also haul coal, 22 yds. per load

The 2 "C's" have also been used to haul coal. On this work, they move about 22 cu. yds. per load. Average 12,000′ cycles are completed every 15 to 20 minutes — in spite of travel through 800′ of belly-deep mud, up 700′ of 16% unfavorable grade and down 200′ of 30% favorable grade. That's 3 to 4 trips (66 to 88 cu. yds.) per hour for each rig.

Whenever *you* have coal, rock, ore, or other shovel material to haul, it will pay you to check the output of fast rear-dump Tournarockers. Write for complete facts and figures on work like yours. We'll be glad to arrange a demonstration for you at your convenience.

Tournarocker—Trademark Reg. U. S. Pat. Off. R-221-CM-b

LeTOURNEAU LET EQUIPMENT

R. G. LeTOURNEAU, INC.

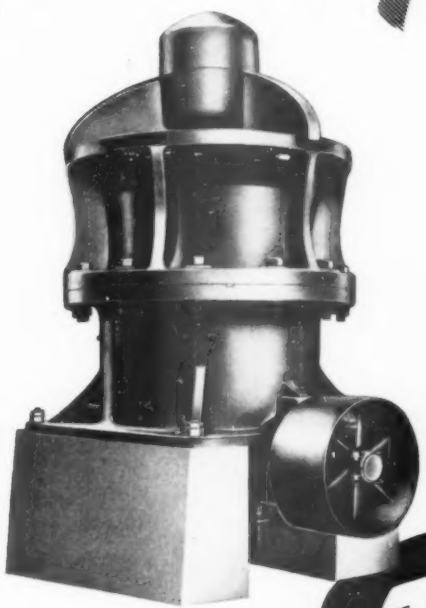
Peoria, Illinois

IT'S THAT

Extra tonnage

YOU GET WITH A TRAYLOR TY
THAT COUNTS FOR

Extra profits



Type TY Traylor Reduction Crusher is noted for its simple, compact design . . . maximum strength and operating efficiency. Built in six sizes with feed openings from 3" to 22".

The extra-heavy construction and exclusive design features of a Traylor TY Reduction Crusher assure extra profits two ways. Less down-time for repairs and greater hourly production with fewer waste fines are both their direct result.

Here's why: Traylor TY's original, self-tightening Bell Head and Curved Concaves apply power more efficiently due to the progressively increasing capacity of each zone in the crushing chamber . . . also they permit finer settings and produce greater tonnage with reduced horse power.

With production costs always inching upward to put the squeeze on profits, it's doubly important to increase production at less cost. Mail the coupon below and get the facts on the ability of a Traylor TY to deliver the goods in *profitable* quantities.

A Traylor LEADS TO GREATER PROFITS

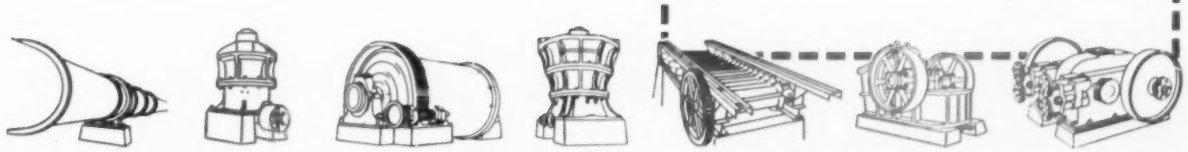
Mail this coupon today!

TRAYLOR ENGINEERING & MFG. CO.
525 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • San Francisco
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P.Q.

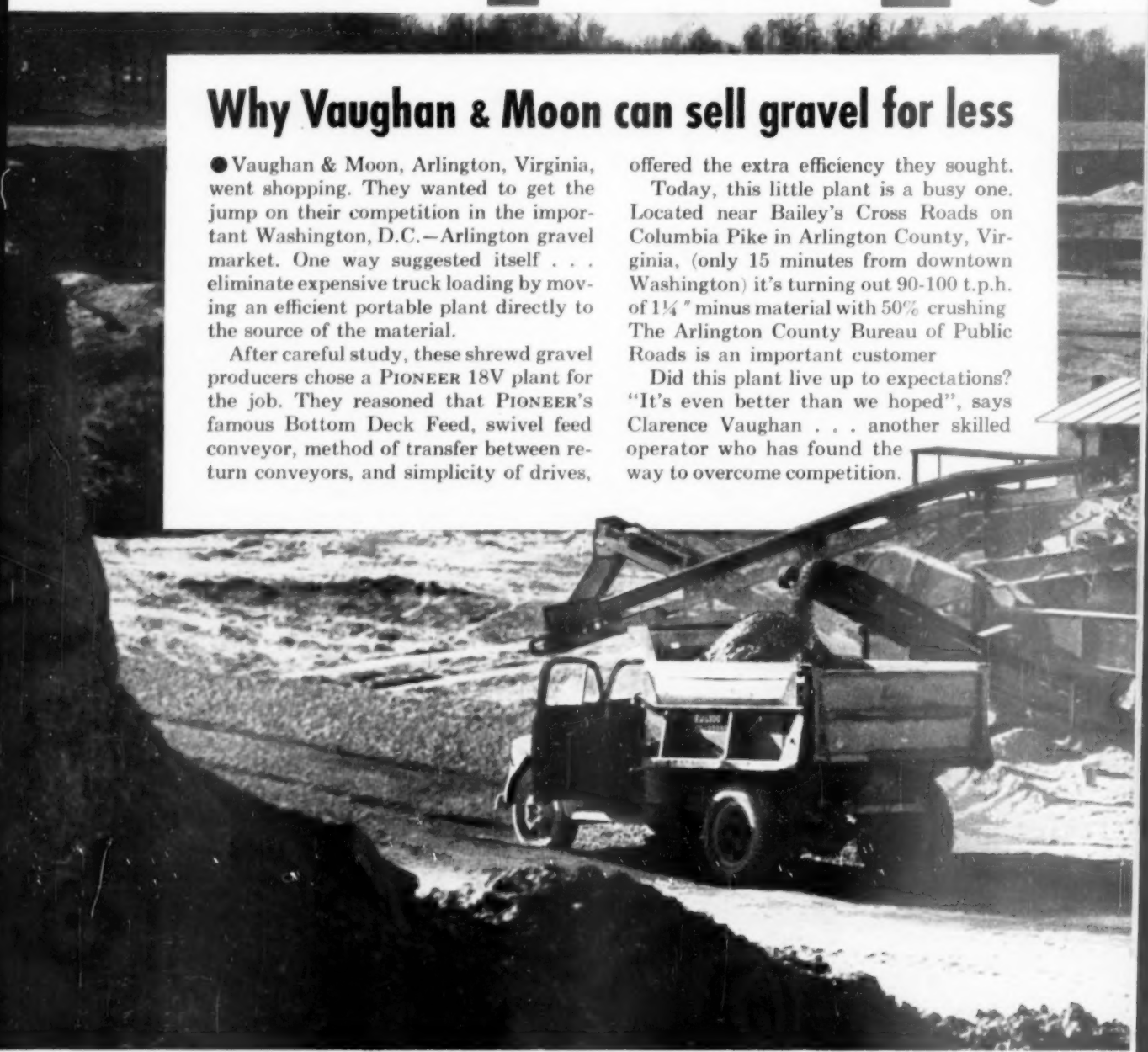
Send Bulletin 7112 immediately, with complete illustrations and specifications on the Traylor TY Reduction Crusher.

Name: _____
Position: _____
Company: _____
Address: _____ State: _____



When competition threatens...

that Pioneer Edge



Why Vaughan & Moon can sell gravel for less

● Vaughan & Moon, Arlington, Virginia, went shopping. They wanted to get the jump on their competition in the important Washington, D.C.—Arlington gravel market. One way suggested itself . . . eliminate expensive truck loading by moving an efficient portable plant directly to the source of the material.

After careful study, these shrewd gravel producers chose a PIONEER 18V plant for the job. They reasoned that PIONEER's famous Bottom Deck Feed, swivel feed conveyor, method of transfer between return conveyors, and simplicity of drives, offered the extra efficiency they sought.

Today, this little plant is a busy one. Located near Bailey's Cross Roads on Columbia Pike in Arlington County, Virginia, (only 15 minutes from downtown Washington) it's turning out 90-100 t.p.h. of 1¼" minus material with 50% crushing The Arlington County Bureau of Public Roads is an important customer

Did this plant live up to expectations? "It's even better than we hoped", says Clarence Vaughan . . . another skilled operator who has found the way to overcome competition.

BUY BOTH!
HIGHER OUTPUT
LOWER UPKEEP

Pioneer

Continuflo EQUIPMENT

tips the balance

How Bottom Deck Feed Boosts Production

First: By an ingenious method of feeding and routing material, Bottom Deck Feed provides twice the *effective* screening area of ordinary plants. This makes it possible to handle a considerably greater screening load without loss in efficiency.

Second: A quick, simple adjustment of the jaw crusher makes it possible to balance the load between the two crushers *while the plant is in full operation*, without changing screens. When material in the pit runs coarse, open the jaw and let the roll crusher do more of the work. When pit material is running fine, close the jaw until it does its full share. Result: both crushers are kept busy . . . and your plant operates at peak efficiency at all times.

There's a Pioneer Portable Plant for every job

Whatever your requirement, there's a PIONEER Portable Plant that will do the job. Duplex plants are now available in seven different sizes, ranging all the way from the little 17V (and 18V shown above), to the big 46VE, with Diesel Electric Drive. All feature the exclusive PIONEER principle of Bottom Deck Feed . . . all offer the famous PIONEER EDGE in performance.

Write for further information . . . *today.*

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• Please send me information on the equipment checked.

☐ GRAVEL PLANTS	☐ WASHING PLANTS	☐ MECHANICAL FEEDERS
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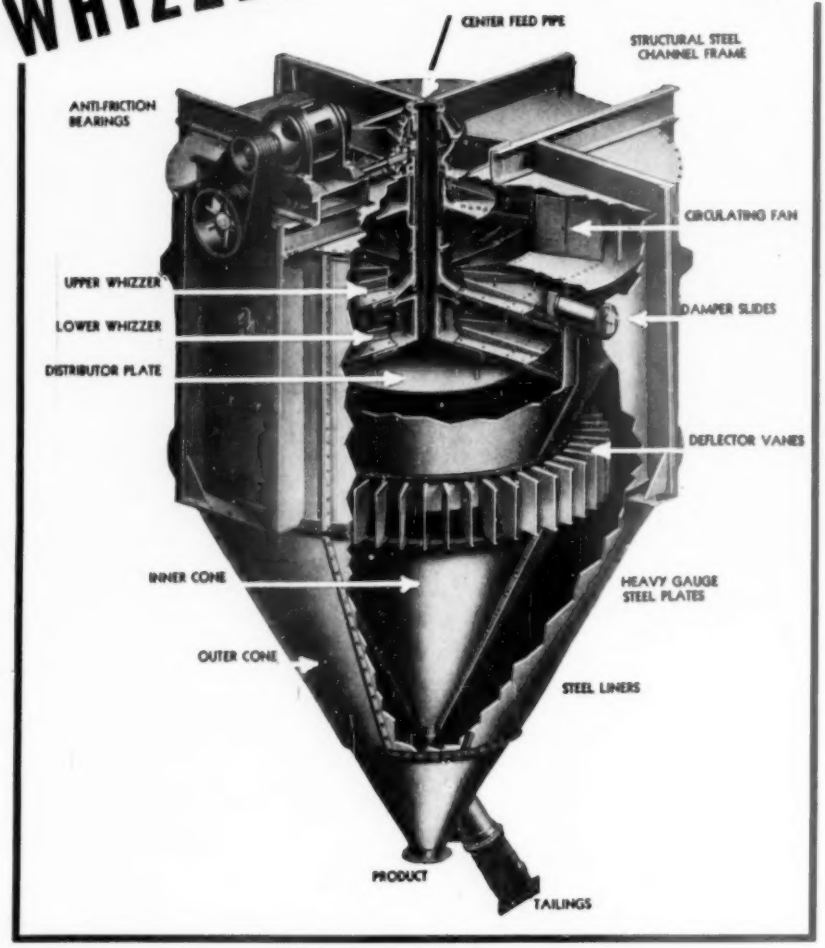
How Raymond WHIZZER SEPARATION

. . . *improves*
CEMENT QUALITY

. . . *reduces*
PRODUCTION COST

Write for Raymond SEPARATOR CATALOG No. 71



Raymond Laboratory Air Separator for classifying test samples

THE Raymond Whizzer-type Mechanical Air Separator is an important unit in closed circuit grinding operations. It gives outstanding results in classifying both raw mix and cement clinker.
These are some of the advantages of Whizzer Separators which have made Raymond equipment so widely used in cement mills and in many other plants throughout the non-metallics industry:—

- **Double Whizzer Separator adjustable externally for the production of standard and high early strength cements**
- **Substantial increase in mill production as compared to open circuit operation**
- **Overall economy due to minimum power consumption, and low maintenance and operating cost**

For a better return on your 1953 investment in separating equipment, specify Raymond Whizzer Separating Units . . . available in a full range of sizes.

COMBUSTION ENGINEERING – SUPERHEATER, INC.

1307 NORTH BRANCH ST.
CHICAGO 22, ILLINOIS

Raymond
PULVERIZER DIVISION

SALES OFFICES IN PRINCIPAL CITIES

"I'm a yellow paint man"

Long ago Caterpillar yellow became the symbol of dependable, economical, hard-working Diesel engines. It's small wonder that Clyde Reed of the Reed Crushed Stone Co. of Gilbertsville, Ky., declares:

"I'm a yellow paint man. I wouldn't have four Cat Engines and a Cat Scraper if this equipment wasn't good. I'm a Caterpillar man from experience."

Latest addition to Mr. Reed's stable of equipment is the newest of the Caterpillar work-horse Diesels—the 250-horsepower D337. This rugged Diesel powers the 33-40 hammer mill on a Cedarapids crusher which produces 80 tons of ¾ and ⅛ inch crushed rock hourly.

High production, sure, but at what fuel cost? Hold on tight. It costs Mr. Reed only 78 cents an hour, or less than *one penny per ton* for fuel! That's because Caterpillar Engines use low-cost No. 2 furnace oil without fouling.

When he purchased the D337, Mr. Reed was *sure* he was getting an engine built for a long, economical life. He already was using a D13000 and D8800 on air compressors and a D318 in a Lorain Shovel. He also owns a No. 80 Scraper.

Let your Caterpillar Dealer demonstrate the big yellow engines that turn red ink to black. And remember that Caterpillar Diesel Engines are available in machines built by leading equipment manufacturers. Specify Cat power in the equipment you buy.

CATERPILLAR, PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

Diesel Engines and Electric Sets

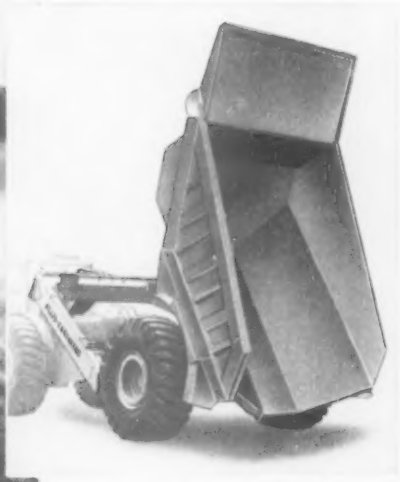
modern, high-production demands call for

strength, stability, speed

you get them all with the Allis-Chalmers rear-dump MOTOR WAGON

BUILT TO TAKE ROCK-SHOCK
Double steel floor is reinforced with heavy oak plank to absorb loading shocks. Front and sides are channel ribbed to provide rigidity. Steering jacks and tires are protected from accidental damage by falling rock.

DUMPS SAFELY . . . CLEANLY — Wheel base remains constant during entire dumping cycle. With this stable wheel base, operator may back to the very edge of a steep fill, set the powerful air brakes on *all four* wheels and put the entire load over the edge.



Clean interior, plus high, 70-degree tilt assures complete load ejection. Body may be heated by exhaust to prevent freezing of materials in severe temperatures.

TRAVELS FAST — High horsepower-to-yardage ratio and large, high-traction rock-lug tires give fast average travel speeds — even on adverse grades and heavy going. Delivers more loads per hour; reduces idle shovel time.

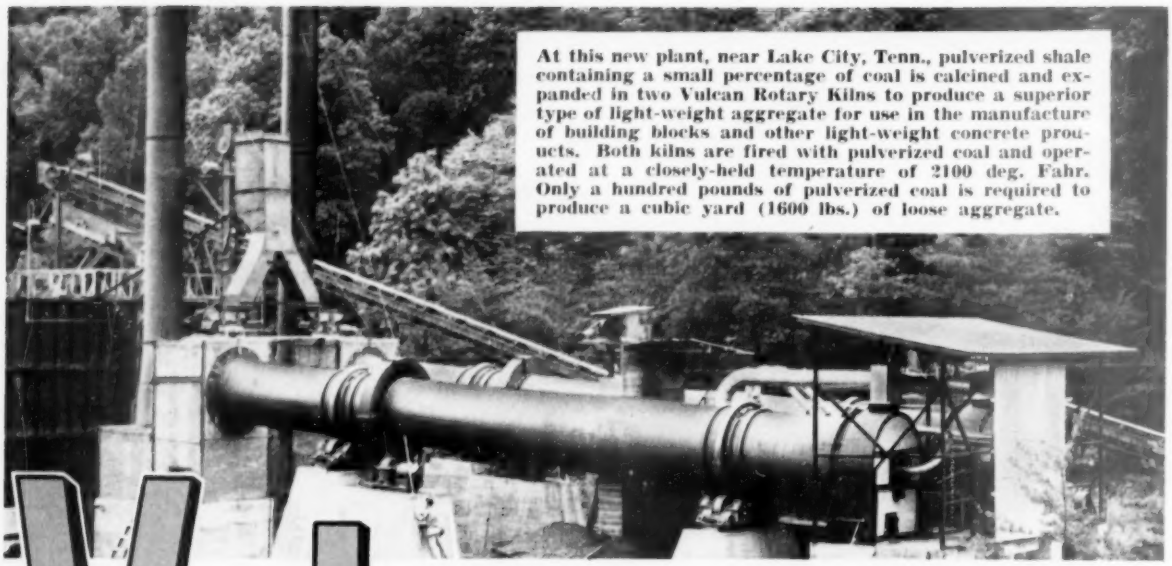
MULTIPLY TRACTOR USE WITH INTERCHANGEABLE SCRAPER BODY . . . for stripping and other self-loading operations. TS-200 Motor Scraper is a high-speed, rubber-tired unit with 13-yard capacity, "through-the-center" boiling action for easy loading, positive forced ejection and many other high-production features.

ALLIS-CHALMERS MODEL TR-200
REAR-DUMP MOTOR WAGON

Choice of Engines—165 hp. Cummins; 176 hp. Buda.
Capacity — 15 cu. yd., heaped; 18 tons.
Speeds — Five forward to 21.6 mph.; reverse to 2.5 mph.
Hydraulic steering and dumping.

Ask your Allis-Chalmers dealer for the full story.

ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U.S.A.



At this new plant, near Lake City, Tenn., pulverized shale containing a small percentage of coal is calcined and expanded in two Vulcan Rotary Kilns to produce a superior type of light-weight aggregate for use in the manufacture of building blocks and other light-weight concrete products. Both kilns are fired with pulverized coal and operated at a closely-held temperature of 2100 deg. Fahr. Only a hundred pounds of pulverized coal is required to produce a cubic yard (1600 lbs.) of loose aggregate.

Making Light-Weight Aggregate with Vulcan ROTARY KILNS

Always a leader in its field the Vulcan Iron Works of Wilkes-Barre has been highly successful in the application of specially-designed rotary kilns to such installations as the one illustrated and described above.

Other recent installations include four 8′ x 125′ rotary kilns for the Basalt Rock Corporation, Napa, Cal., at what is probably the largest plant in the world operated exclusively for the production of light-weight aggregate. In Louisiana, a very modern 8′ x 160′ Vulcan kiln, now being built, will supplement an earlier 8′ x 144′ Vulcan kiln which pioneered the production of light-weight aggregate in the deep South and has given such excellent results that greater capacity is now required.

For efficient, economical, production of light-weight aggregate it is highly essential that kilns be designed to provide the correct temperature range and the correct rate of travel for the material to be expanded. Vulcan engineers welcome opportunities to make constructive suggestions—based on their long experience in this and other fields. No obligation unless, or until, their proposals are accepted.

THIS BOOKLET MAY SAVE YOU MANY HOURS OF PRECIOUS WORKING TIME

It tells how to keep kilns running when trouble occurs—either permanently or until replacement parts can be secured. Better still, it tells how to PREVENT TROUBLE through proper precautions during installation and by watching out for conditions which may cause trouble if not corrected in time. Free on request to any one who can use it to advantage. Ask for Bulletin No. 389.

VULCAN IRON WORKS

Established 1849

Main Office and Works **WILKES-BARRE, PA.,** New York Office 50 Church

Rotary Kilns, Coolers and Dryers	Double-Roll Briquetting Machines	Heavy-Duty Electric Hoists	Steam Locomotives
Rotary Retorts, Calciners, Etc.	Open-Hearth Steel Castings	Self-Contained Electric Hoists	Diesel and Gasoline Locomotives
Improved Vertical Lime Kilns	Steel-Plate Fabrication	Scraper-Loading Hoists	Diesel-Electric Locomotives
Automatic Quick-Lime Hydrators	Shaking-Chute and Chain Conveyors	Cast-Steel Sheaves and Gears	Electric Locomotives and Larrys

This 'Dozer *Pays* its way

A D2 Tractor with Cat No. 2S Bulldozer stockpiles shot sand at Cowell, Calif. Also shown is Mr. Charles Laws, the owner.

Any Caterpillar Bulldozer will keep busy and more than earn its keep on a sand-pit or quarry operation. This D2-No. 2S 'Dozer, owned by Charles Laws, of Concord, California, is no exception.

Smallest bulldozer unit in the Caterpillar line, the D2-No. 2S is built with the same rugged strength and powered by the same type of dependable Caterpillar Engine as its big brothers. That's why Mr. Laws bought it. He had had experience with Caterpillar track-type Tractors on a logging show and knew what they could do.

This particular unit is used for stockpiling shot sand and stripping light overburden. But the D2 'Dozer is an excellent tool for other jobs, such as feeding the loader and building access roads. It's a quick, sure-footed machine, easy to handle. And because it uses low-cost No. 2 furnace fuel without fouling, and stays on the job without tinkering, its operating economy is outstanding.

Your Caterpillar Dealer has a complete line of sturdy Cat Bulldozers, matched to all tractor sizes. He'll be glad to demonstrate the unit you need. And he'll back its long work life with reliable service and genuine Caterpillar parts. See him now.

CATERPILLAR
REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

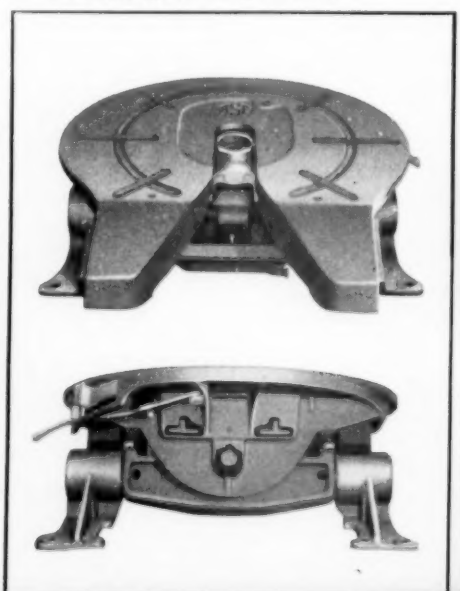
CATERPILLAR, PEORIA, ILLINOIS

Marion shovel, loading a 34-ton coal payload into one of 23 Austin-Western trailers powered by Dart tractors. Scene is at Midland Electric Coal Corporation's strip mine near Farmington, Ill.

ASF Safety 5th Wheels have to be tough to stand up in this heavy-duty service, especially during wet weather when tractors are needed at each end of the semi to get it out of soft ground. Because ASF 5th Wheels are so easy to uncouple, in effect Midland has a *flexible pool* of load-carrying equipment and motive power, rather than 23 separate units. The result is fuller, more efficient use of available equipment.

Back and turn on a dime—In addition to quick interchange between motive power and load-carrying equipment, the tractor-trailer is highly maneuverable. ASF 5th Wheels are side-oscillating: even a full load can be safely and easily jackknifed for a short turning radius.

Heart of the semi—the ASF 5th Wheel—36" extra-heavy-duty ASF Safety 5th Wheel made for the rugged service and heavy loads found in off-highway work. Note the heavily reinforced plate; the massive "I" section center beam; the extra-strong mounting brackets.



He speaks through firsthand experience—M. R. Heckard, Superintendent of Equipment, has used ASF Safety 5th Wheels on all semi's for 11 years. He particularly likes the comparatively new 36" wheel shown at left; feels it will cut maintenance costs to a new low.

The Midland Electric Coal Corporation proves that your best investment for efficient tractor-trailer operation is an ASF Safety 5th Wheel . . .

"Best of all—they're easy to uncouple"

Ease of uncoupling is one of the big reasons why ASF Safety 5th Wheels are standard equipment on the fleet of semi's at Midland Electric Coal Corporation's strip mine near Farmington, Ill. M. R. "Marty" Heckard, Superintendent of Equipment, says:

"We use ASF 5th Wheels on all our semi's, and each wheel takes a real beating during the loading and hauling of a 34-ton payload around 30 times a day.

"One of the main reasons why we like these 5th Wheels is because they are easy to keep free of slack. We just add a shim usually once a year.

"Best of all, however, they are easy to uncouple in a matter of minutes. We can easily shop the tractor for maintenance without the trailer, or vice versa. Working on one at a time makes servicing easier, and we avoid tying up the whole semi."

Quick interchange between motive power and load-carrying equipment is a real asset in mining and quarry work. And there's no denying that you get it with a tractor-trailer. But a 5th wheel—or any hitching device—tends to defeat its purpose if it's hard to uncouple.

Easy uncoupling can save you time, trouble and expense, as it has in this modern strip mine operation. But, it's equally important to know that the ASF Wheel *only uncouples when you want it to uncouple*. This is no beefed-up highway wheel. It's made specially for heavy-duty off-highway service, from the "I" section center beam to the side-oscillating plate that absorbs the sidestrain of uneven roadway. Until a twist of the wrist releases the king-pin, it's built to *stay* coupled—come shocks, strains or high water!

Get the facts on the best 5th wheel investment you can make! See your nearest ASF Distributor, or write: American Steel Foundries, Automotive Division, 410 N. Michigan Avenue, Chicago 11, Ill.

remember this . . . about ASF safety 5th wheels

Largest king-pin bearing area of any 5th wheel . . . Stresses absorbed by a larger bearing area—larger than any other 5th wheel—means longer life for king-pin and jaws.

Shorter king-pin bending leverage . . . Jaws grip the king-pin at the top. The pin *stays straight*—and can't "spring" or disengage.

Side oscillation protects equipment . . . 1½° of free oscillation—plus 5½" controlled by rubber stabilizers—absorbs sidestrain of uneven roadway.

Heavy, cast alloy-steel construction . . . Plate is hinged on strong, rigid "I" beam with big 2" pin. Extra large contact area between plate and beam doubles rocker life. Both rocker and cast-steel bracket are bronze-bushed to cut wear to a minimum.

Easy to maintain in perfect operating condition . . . Wear is inevitable, but on ASF Wheels, it's easily counteracted simply by inserting one or more low-cost shims between buffer and housing front wall. Result? Like-new service, without expensive rebuilding!

A quick glance tells you the lock is LOCKED . . .

LOCKED—as quickly shown by the lever position. The easy-to-see lever can only be in this position when the jaws are truly locked.

UNLOCKING—with an easy twist of the wrist. Simply move the safety dog up, and pull the lever forward.

UNLOCKED—and ready for coupling. The lever moves back to locked position only when the jaws are locked!

A 3,000-pound "compression-grip" saves your maintenance dollars . . .

COUPLING—as the king-pin enters the jaws, the jaws are forced back against the exclusive ASF rubber buffer block, building up compression.

COMPRESSING—3000 pounds are built up before the lock clears the rear jaw, allowing lock to snap to locked position.

LOCKED—and the jaws *remain* under compression. The grip is like a vise; eliminates the slack and backlash that can cost you money in added 5th wheel and king-pin wear.

THINK BIG... WHEN YOU

BIG CAPACITY **BIG PROFIT**

BIG PERFORMANCE

THINK CEDARAPIDS...

for higher percentages of secondary crushing and greater screening capacity

THE COMMANDER

Here's a plant that averaged 350 tons per hour of 1" material *with 20% crush* on a job in Minnesota. In another pit, the Commander produced 445 tons of ¾" material per hour with approximately 12% to 15% crushing! That's the kind of output that lets you *think big* about aggregate production and profit.

The Cedarapids Commander was designed specifically for producers who need greater output of fine-crushed products, or whose pit conditions put a bigger load on the secondary crusher. The big 30" by 22" roll crusher increases secondary crushing capacity by approximately 50% and steps up the stage of reduction.

To balance out this greater roll crusher output, the large 48" x 10' two-and-a-half deck horizontal vibrating screen provides 30% more screening capacity for the plant. The feed conveyor, delivery conveyors and under-crusher conveyor are 30" wide to handle the higher capacity of the plant. Best of all, *maintenance and operating costs are as low as on other Cedarapids plants!*

ANOTHER Cedarapids PRODUCT

The Commander is loaded with other big production features. Ask Commander owners for facts and figures or see your Cedarapids distributor for complete details.

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U.S.A.

MASTER TANDEM
Here's the biggest all-around gravel producer in the Iowa line. With a 10" x 36" jaw crusher, 40" x 22" roll crusher and 48" x 12' screen, the Master Tandem is really the master of low-cost, big volume production on a wide variety of crushing and screening jobs.

PITMASTER
This is the plant you'll want for smaller jobs. The Pitmaster's 10" x 16" jaw crusher, 16" x 16" roll crusher and 30" x 9'5" screen assure excellent production and extremely economical operation. For pits with a higher percent of oversize, ask about the Twin Jaw Pitmaster.

DOUBLE IMPELLER IMPACT BREAKER
When you need cubical shaped aggregate in tremendous volume, check the performance records of this impact breaker. On one job, the big Model 5050 established a peak production record of 724 tons per hour. Exceptionally low-cost operation assures a high return on your investment.

THINK OF AGGREGATE PRODUCTION

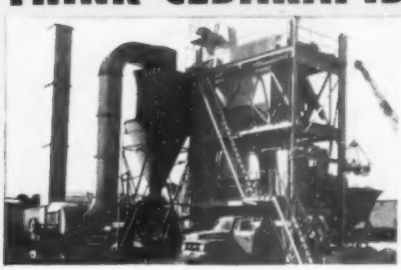
Solving the "growing-pain" problems of our highway system is a real job. It *can* be done, but it will take big thinking. Billions of tons of aggregate are needed to keep America on wheels. *Think big* about equipment to produce it!

Think of equipment that produces greater hourly tonnages than ever before . . . equipment that's quality-built to take a daily beating in the world's toughest industry, and still keep slugging away, month after month. Think about the bidding advantages of equipment that combines big capacities with low operating and maintenance expense to hold per ton costs to levels comparable with those of twenty years ago!

You American contractors have the know-how to solve the critical highway problem . . . Cedarapids provides the equipment to help you *think big* about profitable production of big volumes of aggregate.

FOR EVERY CRUSHING AND SCREENING JOB

THINK CEDARAPIDS... WHEN YOU THINK BLACK TOP

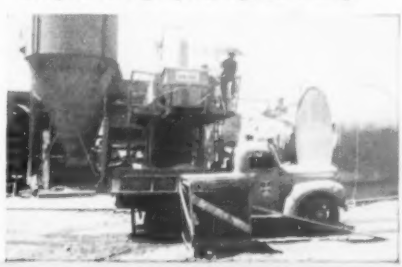


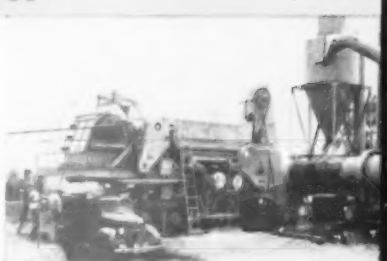
MODEL E

Two tons at a batch is average production for this Cedarapids Bituminous Mixing Plant. All-electric operation plus automatic time controls, signal lights and air controls insure absolute accuracy of mix and profitable production for low-bidding contractors.

MASTER PLANT

This two unit continuous-mix plant combines the Cedarapids Master Mixer and Gradation Control to supply specification mix in big volume. The mixing unit is offered with either a twin shaft pugmill which conforms to all existing specifications, or a single shaft pugmill designed for high speed, vigorous mixing.





MODEL FA

The most portable batch type bituminous mixer in the Cedarapids line. The FA can be set up for operation in a matter of hours. Centralized controls insure fast, easy, one-man operation. Balanced coordination of every part produces up to 350 tons per day of accurately weighed and uniformly mixed aggregates and bitumen. Quality-built for long-term service at lowest cost.

"Couldn't Kink Them, Even When We Tried," . . .

Tuffy® Slings

Other Specially Designed Tuffys For Special Uses

Tuffy SCRAPER ROPE

Created to stand up under stresses and strains imposed by wheeled scrapers. Flexible to withstand sharp bends . . . stiff enough to resist looping and kinking when slack.

Tuffy DRAGLINES

Finer construction technique and toughened materials pay off in maximum abrasive resistance. Provides extra flexibility with no loss in quality . . . spools better and rides better on grooves, hugs drum when casting.

Tuffy DOZER ROPE

A special, tougher construction for tough dozer service on 150' reels for mounting on the tractor just back of the wedge socket. By feeding through only enough rope from the reel to replace section damaged on the drum, users report up to 300% savings in rope costs and half the down time.

Braided Construction Lets Tuffy Slings Straighten Out with No Damage

This Pennsylvania construction company owner proved to himself that Tuffy Slings are extra flexible, extra strong. He knows the patented, braided construction actively fights off knots and kinks . . . and after using Tuffy Slings for over a year, he knows they last longer under most rugged use!

Some stranded wire ropes may have the strength needed for sling work, but they are hard to handle and hitch because of their stiffness. Also, they're subject to kinking and material damage when bent around small radii.

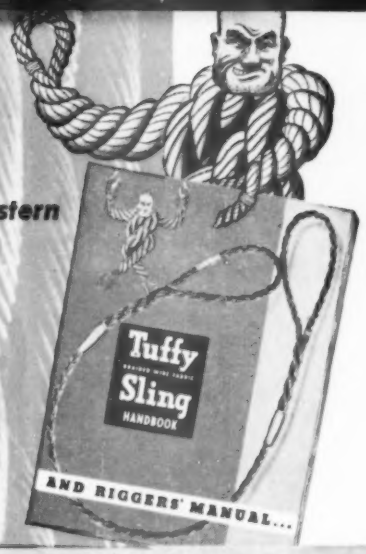
When you use Tuffy Slings, you're sure of maximum flexibility *plus* strength, thanks to Tuffy's patented 9 part machine-braided wire fabric construction. The 9 parts are interlaced in an exclusive way that forms a fabric that can be repeatedly bent around abrupt corners. And even when one of the strands is cut or broken, there's no stranding!

* Name Furnished on Request

UNION WIRE ROPE CORP

union Wire Rope corporation

Specialists in Wire Rope and Braided Wire Fabric



Says

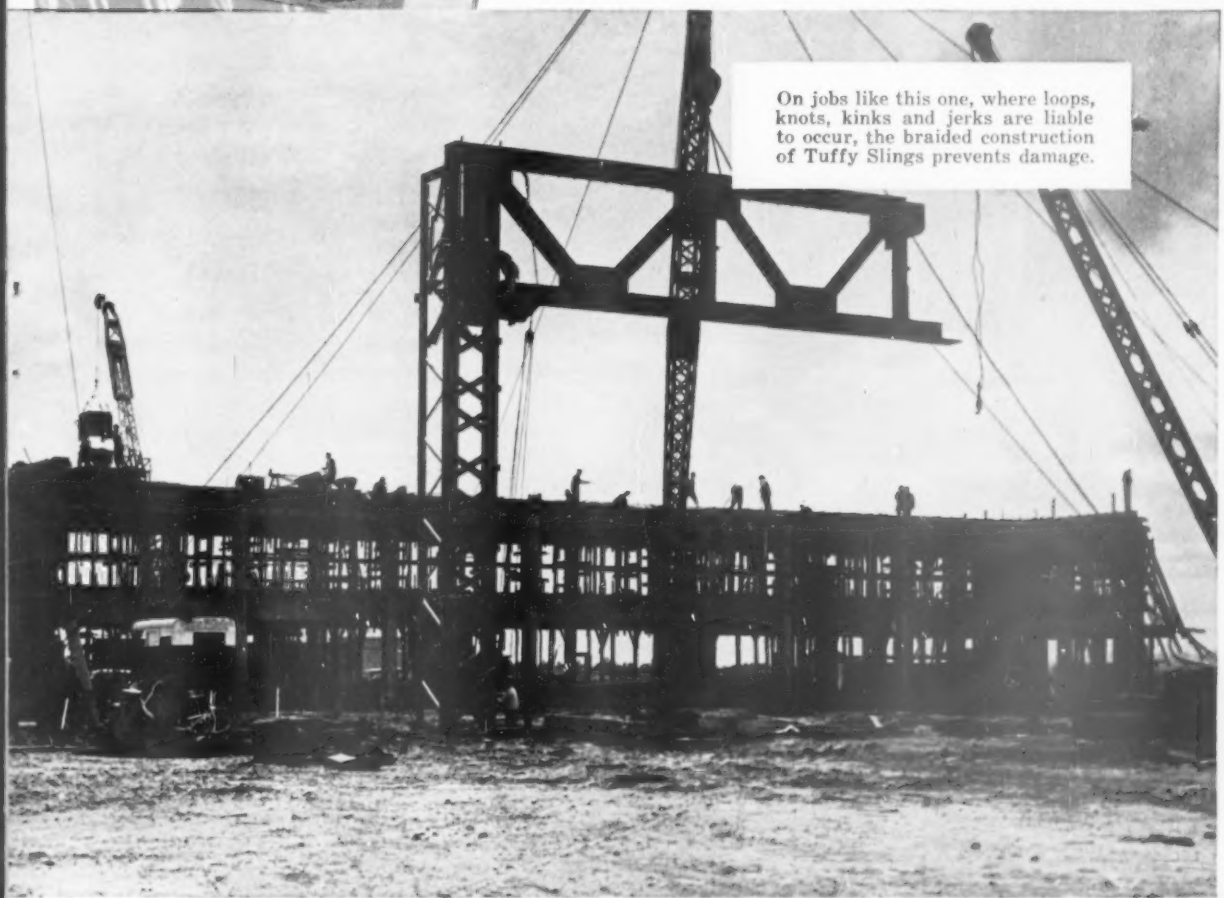
Owner of Eastern Construction Company, Speaking of Tuffy Slings.*

SEND FOR THIS FREE

Sling Handbook

Get This Sling Handbook Absolutely Free!

Contains plenty of factual, useful data on 12 braided sling types . . . various types of sling fittings, 30 illustrations of sling uses, information on splicing Tuffy Slings as well as Wire Rope. It's the only handbook of its kind in the braided sling field, and it's yours for the asking! Get your free copy of the new Tuffy Sling Handbook . . . mail the coupon below *today!*



On jobs like this one, where loops, knots, kinks and jerks are liable to occur, the braided construction of Tuffy Slings prevents damage.

TEAR OFF
AND MAIL COUPON
TODAY

union Specialists

Wire Rope **corporation**
In Wire Rope and Braided Wire Fabric
2156 Manchester Ave., Kansas City 3, Mo.

Please send my FREE copy of the new Tuffy Sling Handbook and Rigger's Manual.

*Firm Name*_____

*By*_____ *Title*_____

*Address*_____ *City*_____ *State*_____

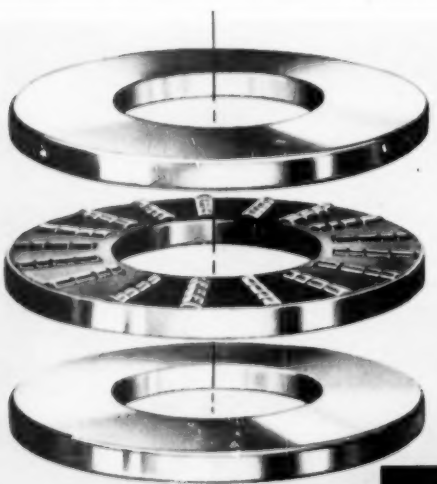
RIGHT ANGLE DESIGN

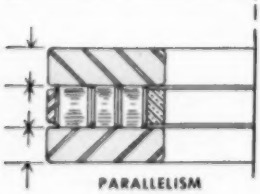
Reduces Maintenance Costs and Shut-Downs

In a Rollway Radial Bearing there's no wedging of the rollers . . . no pinch out . . . far less roller end rub and wear back. Rollway's *Right Angle Design* reduces rubbing friction to a minimum — results in less service attention, longer life expectancy under heavy duty service.

In Thrust Bearing applications, accurate parallelism between the rollers and the matched thrust plates is repeated in the parallelism between the separator slots and the rollers themselves — all adding up to quietness, equalized wear and longer life.

- **RIGHT ANGLE** Roller ends, precisely square to avoid end-rub, oscillation and side-shock.
- **RIGHT ANGLE** Bearing surfaces with parallelism that results in unwavering right-line rolling.
- **RIGHT ANGLE** Separator slots accurately machined to prevent roller skew, slide and uneven wear.

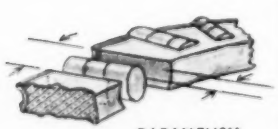




PARALLELISM

Our complete engineering and metallurgical services will gladly work with you on your problems. Simply write or wire any sales office. No cost. No obligation.

Rollway Bearing replacements are available through authorized bearing distributors in principal cities. Consult your classified 'phone directory. Rollway Bearing Co., Inc., Syracuse 4, N. Y.



PARALLELISM

SALES OFFICES

Syracuse, Cleveland, Houston, Boston, Philadelphia, Chicago, Pittsburgh, Detroit, Los Angeles, Toronto

ROLLWAY BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

ONLY HUDSON GUARANTEES TO REPLACE MULTIWALL SACKS DAMAGED ON YOUR PACKER

Exceptional quality of Hudson Multiwall Sacks permits unusual guarantee

PALATKA, FLA. Heretofore each Multiwall Sack user has individually absorbed the cost of any sacks which break on his filling and closing machines. But now, Hudson becomes the first and only Multiwall Sack manufacturer to guarantee to replace such broken sacks at no further cost.

According to experts, the average user of Multiwall Sacks normally expects to write off the loss of certain sacks during each day's run. These sacks are damaged due to circumstances beyond control of the Multiwall Sack manufacturer. Overloading of sacks, malfunction of packing or closing machines, or inattention on the part of the operator are some of the common causes of sack breakage.

Hudson is confident that the quality of the Multiwall Sacks they produce can eliminate most of this breakage. That is why they are willing to offer you complete protection through filling and closing operations. Only a company with a superior product would dare offer their customers such a guarantee.

First in industry to offer this replacement guarantee

T. H. Mittendorf

NEW YORK CITY. "Hudson is the first and only Multiwall Sack manufacturer to offer a written replacement guarantee on breakage of Multiwall Sacks," declared T. H. Mittendorf, Hudson's Vice President in Charge of Sales. "Hudson Multiwall Sacks lead the industry as being the world's most fully guaranteed. We believe they represent the best buy on today's market."

Hudson Representative, Harry Rafferty (center), points out the packing and closing operations covered by Hudson's new guarantee, to J. Dummett (left), Plant Supt. for Wedron Silica Company.

"Under the terms of our unusual guarantee the buyer is protected from the moment he accepts custody of the sacks until the sacks have successfully passed his filling and closing operations. This guarantee greatly extends our usual warranty of quality and workmanship," Mr. Mittendorf pointed out.

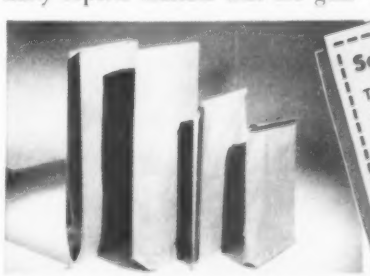
Goes into immediate effect

The new Hudson guarantee plan went into effect with all sacks purchased on or after Sept. 15, 1952. Early reports indicate that the guarantee is being enthusiastically received.

Prompt delivery on all contracts are assured by the tremendous capacity of Hudson's fully integrated mill at Palatka, Fla. High quality is maintained through inspection and controls at every step from tree to the finished Hudson Multiwall Sack. Hudson packaging engineers see that sacks conform to the exact needs of each user.

Urge Multiwall Sack users to write for facts

The Hudson Pulp & Paper Corp. invites all users of Multi...ks to learn how th...y by usi...wall ...ee ...cts ...y ...s, and ...y are promised!



Hudson Multiwall Sacks are available pasted or sewn, and in valve and open mouth styles.

Send for full details:

Tell me, without obligation, about the many advantages of your new Multiwall guarantee.

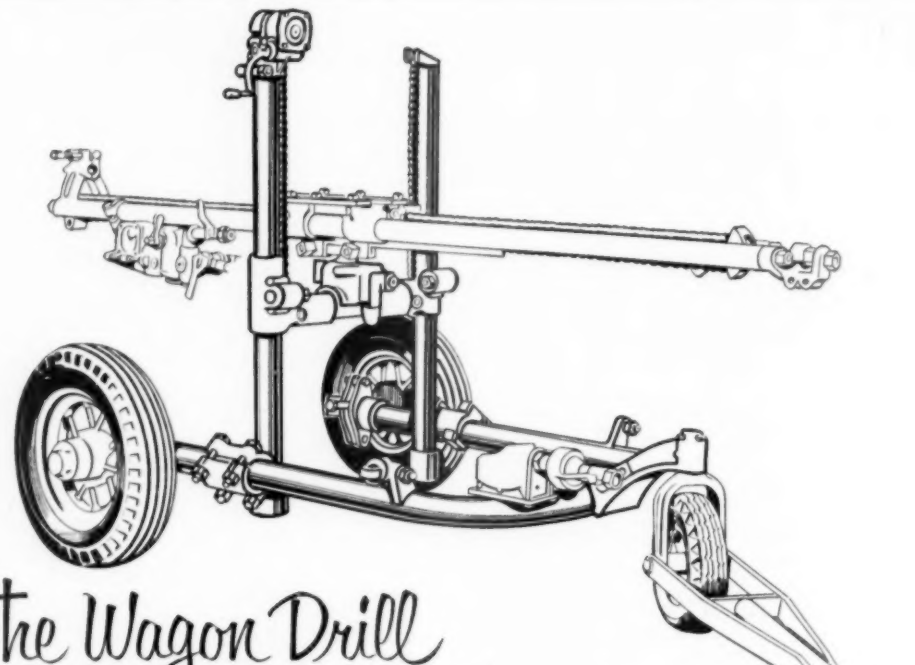
NAME

COMPANY

STREET ZONE STATE

CITY

Hudson Pulp & Paper Corp.
Dept. 112, 505 Park Ave., New York 22, N.Y.



The Wagon Drill with the Tubular Chassis and Drill Carriage

G-300 Wagon Drill

The rugged tubular chassis and drill carriage of the G-300 WAGON DRILL provides rigidity and strength without unnecessary weight.

The tubular "H" structure that supports the drill carriage gives greater stability than the conventional design and minimizes vibration. The all-around sturdy construction of the G-300 maintains correct alignment at all times, insuring maximum drilling efficiency with minimum upkeep.

G-300 Wagon Drill

- is designed to take full advantage of the high drilling speed and strong rotation of the CP 4-inch 70-N Drifter.
- has controls conveniently centralized.
- is equipped with a specially designed feed motor and cone-gear drive for greater load-carrying capacity.
- has a heavy-duty centralizer.
- adaptable for all types of wagon drill work. Wheels can be turned at right angles to facilitate line drilling or drilling close to a ledge or wall.

Write for further information.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

That's All the Cleaning an Allis-Chalmers TEFC Motor Ever Needs

MAINTENANCE COSTS ARE LOW for users of Allis-Chalmers Totally-Enclosed, Fan-Cooled Motors. They are easy to clean because even the stickiest dirt can be wiped or blown off without dismantling the motor or even stopping it. They seldom require cleaning because cooling air flows over the *outside* of the motor. There are no external concealed air passages to clog up and cause over-heating. You get better operational continuity, lower maintenance.

Bearings Save Maintenance, Too

Double-shielded ball bearings require no regular maintenance under most normal operating conditions. Yet if difficult service makes re-lubrication desirable, it can be done without dismantling the motor or bearings. Rigid cast iron frame and stiff end brackets maintain bearing alignment . . . assure maximum bearing life.

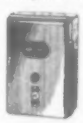
A-3639

Get The Full Story Now

Your Allis-Chalmers Authorized Dealer or District Office can give you complete information on Allis-Chalmers Totally-Enclosed, Fan-Cooled Motors and how they can save you money. Call one of them today or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.

Sold . . Applied . . Serviced . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.



CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

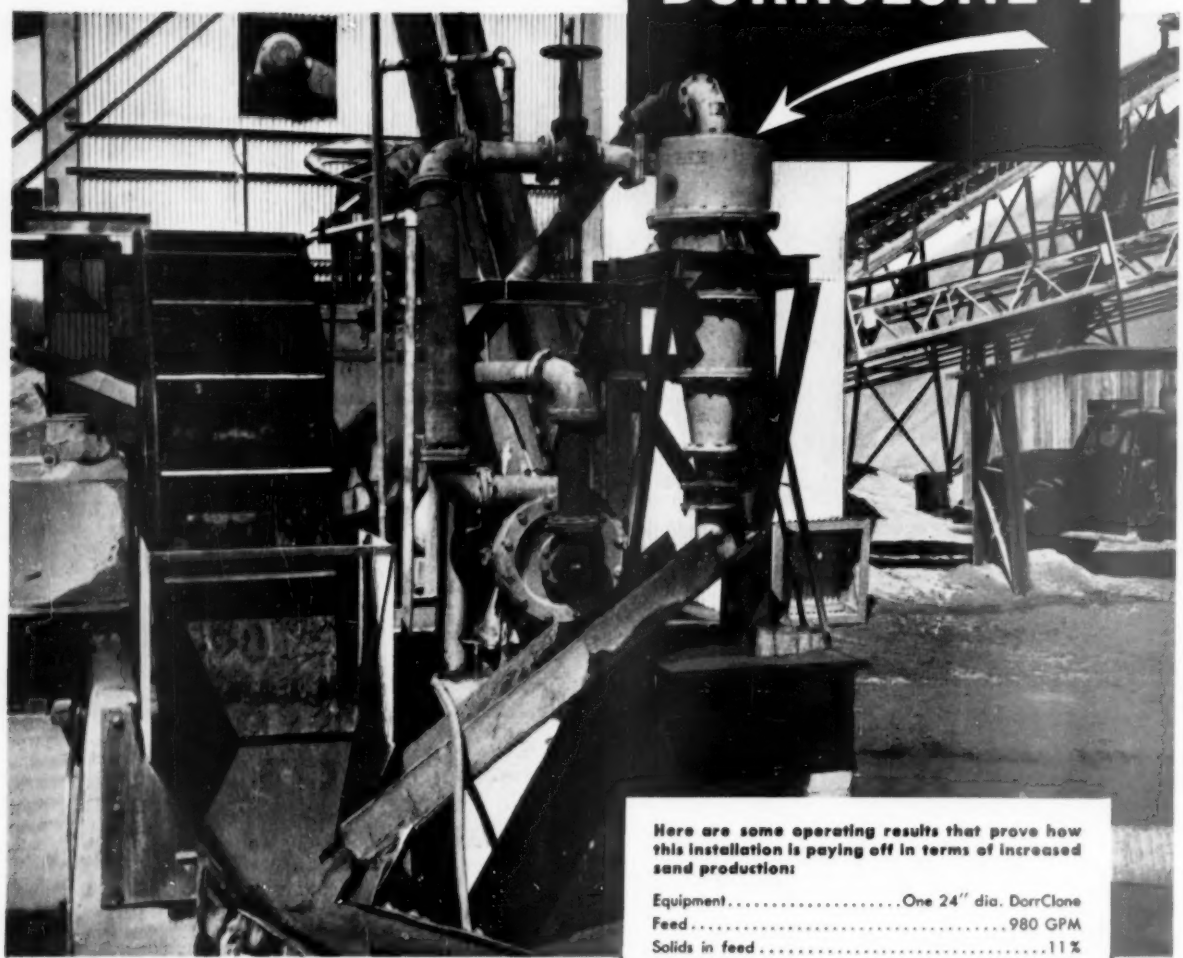
PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and *Vari-Pitch* are Allis-Chalmers Trademarks.

ALLIS-CHALMERS

20 Tons Per Hour of Fine Sand Recovered

In One 24" Dia. DORRCLONE*!



Here are some operating results that prove how this installation is paying off in terms of increased sand production:

Equipment	One 24" dia. DorrClone
Feed	980 GPM
Solids in feed	11%
Underflow	61 GPM
Solids in underflow	73%
Underflow tonnage	20 TPH (dry basis)
Overflow	919 GPM
Solids in overflow	4% (approx.)
Recovery	71%

At Pequannock Sand & Gravel Company, Pequannock, N. J., this 24" dia. DorrClone is recovering 71% of the solids overflowing the sand wheel at the left . . . an average 20 TPH of sand that would otherwise be lost. Underflow is carried by belt conveyor to stockpile for use as mason sand or for blending.

Lost sand is lost profit. If you have a washing operation and are losing valuable sand, drop a line to The Dorr Company, Stamford, Conn. No obligation of course.

*Trademark of The Dorr Company

Better tools TODAY to meet tomorrow's demand

DORRCO

DORR

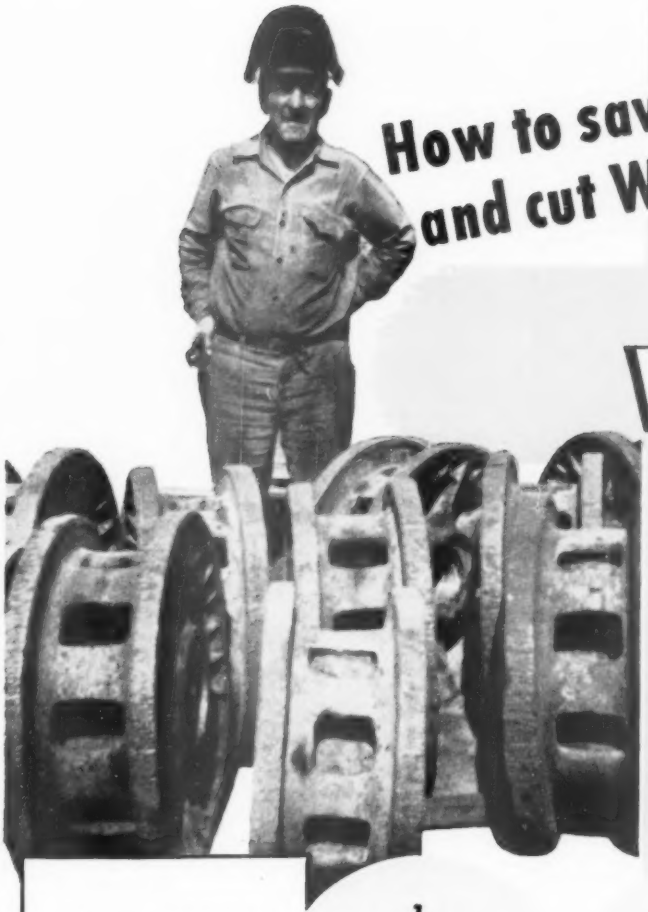
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.

Offices, Associated Companies or Representatives in principal cities of the world.

How to save Parts Cost and cut Welding Time . . .

HARDFACE with VICTORALLOY



Take a tip from the job superintendent who repaired these worn idlers. Rather than wait until they were completely worn out, he hardfaced with VICTORALLOY as soon as one pass was required to bring them back to size. His welders estimate VICTORALLOY cut welding time 25 to 50% and saved rod because:

One pass and 100 lbs. of VICTORALLOY rebuilt these ten track idlers, thus saved costly replacement!

1.

VICTORALLOY has a high burn-off rate—6 lbs. per hour.

2.

VICTORALLOY's high rounded bead deposits as much metal in one pass as most other rods do in two.

3.

VICTORALLOY leaves no slag, thus eliminates chipping and cleaning on multiple pass work.

VICTOR

Welding and Cutting Equipment Since 1910

For better welding equipment and supplies look for the VICTOR dealer sign. Dealer inquiries invited.

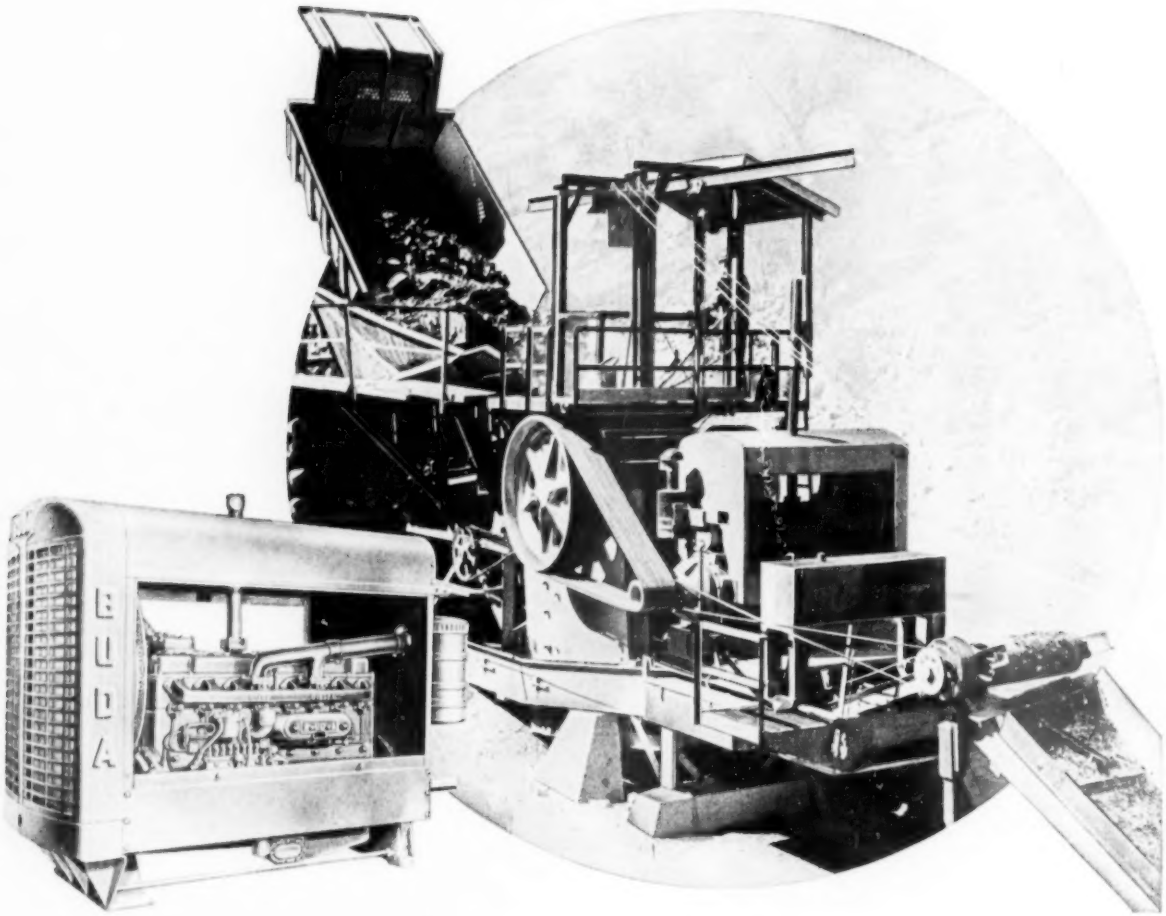
Idlers, tracks, sprockets and other parts hardfaced with VICTORALLOY "wear-in" with a smooth, highly-polished surface, last twice as long as new parts. See for yourself how VICTORALLOY saves parts cost, rod and welding time. Order a supply TODAY.

VICTOR EQUIPMENT COMPANY

3821 Santa Fe Ave.
LOS ANGELES 58

844 Folsom Street
SAN FRANCISCO 7

1312 W. Lake St.
CHICAGO 7



BUDA DIESELS GIVE YOU:

EXTRA HORSEPOWER — 12 to 16% more displacement means more power—greater reserve for occasional overloads.

HIGHER TORQUE — Buda Diesels have up to 14% higher torque at normal operating speeds—greater lugging ability in the *economical* operating range.

LONGER LIFE — Buda Diesels are averaging 6000 hrs. (or more) before overhaul. "Clean", simple design, heavy duty construction—fewer parts—less maintenance make Budas the most economical engines you can buy.

For more profitable operation of your crushers, trucks, shovels, dozers or scrapers, ask your Buda Engine Distributor for full details on Buda dyna-swirl Diesels today. Write for Bulletins and Specification data. The Buda Company, Harvey, Illinois.

BC-24

BUDA *a Power-Full and Dependable Engine* ***FOR EVERY NEED***

Amsco Chains Get Tougher With Use

How AMSCO Manganese Steel Chains Acquire Progressively Greater Resistance to Impact and Abrasion.

Actual case histories prove that AMSCO Manganese Chains outlast ordinary chains by more than 6 to 1 where impact and abrasion exist. For example, on one conveyor operation, ordinary chain had to be completely replaced every three months. When AMSCO Manganese Steel Chain was installed, only a small fraction of the links were replaced during a test period of over 24 months.

Users of AMSCO Chains benefit by unusual freedom from expensive chain replacement, breakage, maintenance-down-time and other problems caused by impact and abrasion conditions.

AMSCO Manganese Steel Chains have the unique ability to work-harden with use. In rough service, they develop a surface hardness up to 500 Brinell. They also acquire a hard glass-like polish that helps shrug off grinding abrasion. All AMSCO Manganese Steel products — tough when produced — possess the extra-value quality of actually increasing durability with in-use battering and grinding.

AMSCO Chains are made of Manganese Steel —the "Toughest Steel Known." They are produced in many standard and special shapes by American Manganese Steel Division—largest producer of manganese steel for all industry.

If you use chain, and desire a more durable alloy, you are invited to contact AMSCO. There's a good chance we can save you money and provide chains that will outlast your service life expectations.

Drag Line Type Chain—Mining & Excavating

AMSCO Chain Assumes Many Forms To Serve Industry. A Few Are:

Detachable Chain—Bucket Elevating

Pinlock Type with Cast-on Dog—Log Hauling

840 Series Chain—Bucket Elevating

Rivetless Chain—Mining

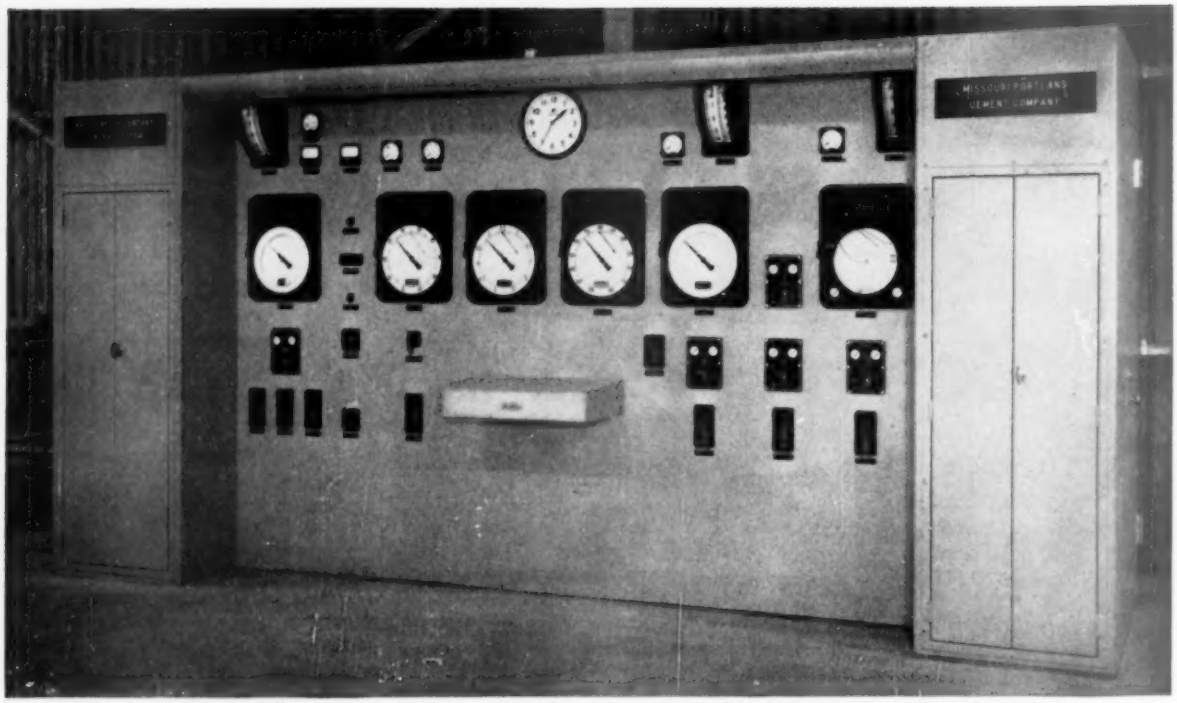
Clinker Drag Chain—Cement Milling

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

377 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.



Main Panel Board for control of 3000 bbl per day Kiln at Missouri Portland Cement Company, St. Louis, Missouri.

3 Ways Better

...Bailey Control for Rotary Kilns

Bailey Control for Rotary Kilns gives you better performance three ways:

1. Economical Operation
2. Uniform Quality of Product
3. Reduced Maintenance

These are advantages which can be achieved when all phases of kiln operation are coordinated to work together as a team. Here's how Bailey Kiln Control can help you get all three.

ECONOMICAL OPERATION

With Bailey Combustion Control you can be certain that you are getting maximum product for every unit of fuel you burn. Bailey Control closely guards the Fuel-Air Ratio, Hood Draft, Fuel Feed, Clinker Cooling and the Temperature of Air for Combustion.

UNIFORM QUALITY OF PRODUCT

Bailey Instruments and Controls can help you achieve a uniform high grade product. Measurements of temperatures, kiln speed, combustibles content, and oxygen content can be transmitted to recorders on centrally located control boards like the one shown. There is no sacrifice of accuracy or speed of response. High temperature alarm contacts may also be provided with Bailey Pyrometers as a further aid in achieving optimum uniformity of product.

REDUCED MAINTENANCE

By maintaining uniform temperatures and excess air conditions in the kiln, Bailey Controls help to reduce to a minimum costly refractory repairs and wear and tear on auxiliary equipment.

Bailey Meter Company has a staff of engineers who are experts in the control of rotary kilns. Assure yourself of optimum kiln performance. Let one of these men help plan your Kiln Control System. P-22

BAILEY METER COMPANY

1039 IVANHOE ROAD • • • CLEVELAND 10, OHIO

Controls for Processing

TEMPERATURE
PRESSURE
% OXYGEN
% COMBUSTION
FLOW
LEVEL
DENSITY
RATIO

drill holes faster

– get greater footage, better fragmentation, lower costs

Use a

Le Roi-CLEVELAND

T286 Self-Propelled Dual Drill Rig

It's 2 Le Roi-CLEVELAND patented air feeds and drills with air-motor booms mounted on a 25-hp tractor

3 speeds forward . . . 1 speed reverse

One Le Roi Airmaster 600 cfm Compressor provides all the low-cost air you need to operate the T286 Dual Drill Rig, when it is equipped with Le Roi-CLEVELAND 4" drifters. A smaller compressor is sufficient, when the T286 is equipped with the 45-lb. H10 or 80-lb. H23 (3⅛"-bore) sinker drills or 3½"-bore D25 drifter.

WITH a Le Roi-CLEVELAND T286, your man *drives* where he wants to go — over almost any kind of ground — and tows the compressor right along.

He drills and cleans holes as deep as 30' — in any direction — at any angle — with less air.

Have your nearby Le Roi distributor show you how this all adds up to faster drilling, better hole spacing, greater footage, better fragmentation, lower costs.

Write for Bulletin RD-21.

C-142

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION

12500 Berea Road • Cleveland 11, Ohio

Plants: Milwaukee, Cleveland and Greenwich, Ohio

Produce Your HIGHER PROFITS SPECIFICATION SANDS

. . . . . with **WEMCO** *Sand Preparation Machines*

Here's What We Mean!

An important operator (name upon request) facing the problem of losing his market due to inabilities of his sand circuit to produce specification sands, called on WEMCO to help solve the problem. WEMCO found that too many fine sands were being wasted. Based on the analysis, a #48 WEMCO machine was installed—**giving these results:**

- *Cost of installation paid for itself in 130 days!*
- *Specifications were met—capacity increased 40%!*
- *Sand losses on 100 mesh reduced 136 times!*
- *Sand losses on 200 mesh cut 21 times!*
- *Total sand losses cut 10 times!*
- *Saved* **53** *tons* **additional** *sand per day!*

The WEMCO Sand Preparation Machine was designed to produce specification sands **economically.** Its almost automatic operation gives sharp, accurate separations between desired sands and waste materials such as slime, clay and excessive size fractions.

These important features establish WEMCO superiority in producing clean, specification sands:

- *large settling area*
- *wide overflow weir capacity*
- *high raking capacity*
- *sharp sizing separations*
- *low maintenance costs*
- *low horsepower*
- *minimum attendance requirements*

WEMCO Can Aid You!

Whatever your sand washing problem may be—loss of fines, high cost of operation, inability to meet specifications, control of size fractions—**drop WEMCO a line today.** You are under no obligation in obtaining our engineering recommendation.

OTHER WEMCO PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners
HMS Pumps • Densifiers • Cone Separators
Drum Separators • Fagergren Laboratory Units
Fagergren & Steffensen Flotation Machines
Hydroseparators • HMS Laboratory Units
Dewatering Spirals • Agitators • S-H Classifiers
Thickeners • Sand Pumps • Conditioners

WEMCO
WESTERN MACHINERY COMPANY
760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

Eaton 2-Speed Axle Trucks haul more, quicker, longer,

at lower cost

Eaton 2-Speeds give drivers the right gear ratio for road, load, and traffic conditions; permit quicker trips with full loads; reduce both operating and maintenance costs, make trucks last longer and worth more when traded in.

Ask your dealer for performance-record proof.

EATON AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Another Dynamatic "FIRST"

Dynamatic eddy current rotating apparatus has been used for many years in a wide range of industries for better speed control, quality control, and minimum operating costs.

This universal acceptance has now been extended to include the cement industry at the new Penn-Dixie Cement Plant recently put into operation at Kingsport, Tennessee.

A Dynamatic model 10W liquid cooled coupling driven from a 350 H.P., 514 R.P.M. synchronous motor, drives the induced draft fan to handle all the air through the kiln. A model 8W liquid cooled coupling is used for the main kiln drive and is driven by a 200 H.P., 1200 R.P.M. cage motor. Small Dynamatic air cooled couplings are used on the synchronized slurry feed drive, the cooler drive, and the coal feeder drive.

The large liquid cooled couplings and all auxiliary drives are simultaneously controlled by heavy duty dust-tight industrial electronic controls arranged with automatic transfer switches to insure continuous operation and accurate speed regulation.

Write for Illustrated Literature

DYNAMATIC® CORPORATION • KENOSHA WISCONSIN

Subsidiary of **EATON MANUFACTURING COMPANY**, Cleveland, Ohio

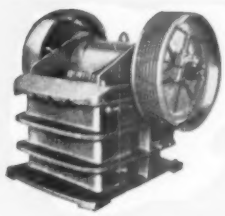
Dynamometers • Oil Well Draw-Works Brakes • Adjustable-Speed Couplings • Eddy-Current Brakes
Ajusto-Spedes • Shovel Clutches • Press Drives • Lift Truck Clutches • Electronic Controls

Look To **LIPPMANN** *For Complete*

Crushing, Washing, Screening Machinery

For 32 years Lippmann engineers have specialized in the design and construction of machinery and plants to produce crushed stone, sand and gravel. During that time they have earned the confidence of the industry to the extent that Lippmann equipment is the choice of many leading aggregate producers and contractors.

You, too, can look to Lippmann with confidence for the finest of equipment to meet your needs — for individual crushers, feeders, screens, washers or conveyors — or for complete plants. Lippmann Engineering Works, 4605 West Mitchell Street, Milwaukee 14, Wisconsin, U. S. A.

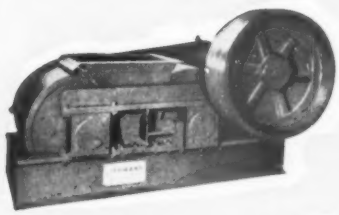


JAW CRUSHERS

Sizes up to 36 x 48 inches (the largest overhead eccentric jaw crusher made). Features 25% more crushing area, non-choking construction, maximum output, minimum power use and maintenance.

GYRATORY CRUSHERS

Revolutionary anti-friction gyratory operation with parallel shaft rotation results in lighter weight, less power consumption, reduced maintenance and controlled product size. Sizes 25 to 72 inches.



ROLL CRUSHERS

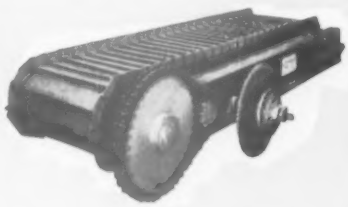
Offer real economy in secondary crushing. Exact product size control; tapered roller bearings; a variety of shell face patterns available; easily replaceable wear plates reduce maintenance. Sizes up to 72" x 24" rolls.

CONVEYORS

Complete line of both portable and stationary conveyors. Lippmann Life-Sealed ball bearing conveyor idlers are outstanding for lower first cost and maintenance. Ball bearings are lubricated for life.

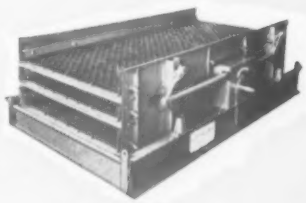
APRON FEEDERS

LIPPMANN makes apron feeders and plate feeders to meet all feeding requirements. Every design has been thoroughly proven by rigorous field service and built for long wear and low power requirements.



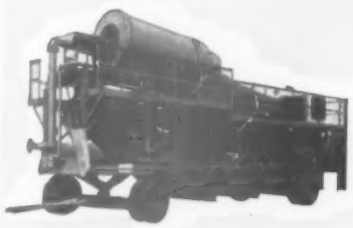
SCREENS

Vibrating screen pictured is positive eccentric type with equally distributed vibration for maximum capacity. Vibration contained in screen body entirely. All sizes, single and multi-deck.



PORTABLE PLANTS

Portable washing plants, as pictured, combine scrubber, vibrating screen, sand drag, conveyors. Capacities up to 120 cu. yd. per hour. Lippmann also makes trailer and self-propelled crushing plants including screening and loading elements.



PULVERIZERS

An unusual design of hammer-type crusher with unmatched records of capacity, product size and quality control, low first-cost and ease of maintenance. Manganese hammers, forged hammer arms and other outstanding design features. Sizes up to 40" x 36".

LEW **LIPPMANN**

CRUSHERS FEEDERS SCREENS CONVEYORS ELEVATORS HOPPERS BINS

How U. S. Rubber belt engineers cut installation costs

View of 24" U. S. Giant Conveyor Belt carrying aggregate from mixing hopper to loading hopper in plant No. 2, Builders Supply Co., Houston, Texas.

Junction between cross belt and incline belt. They convey the aggregate to concrete mixing tower, which in turn supplies the waiting trucks.

In a new concrete mix plant, original plans called for the installation of a 5-ply, 36 oz. duck conveyor belt to handle the aggregates. But United States Rubber Company engineers pointed out that their 4-ply, 42 oz. duck belt would not only cost less, but would be more flexible crosswise to trough, would train more easily and provide high-tensile strength as well. This 1,275-foot, 4-ply U.S. Giant Conveyor Belt was installed. It travels 300' per minute and delivers 294 tons per hour.

This is another instance of why it pays to consult "U.S." engineers before going ahead on a conveyor belt problem. Remember that they are backed by a wealth of experience and vast research facilities. Finally, they will work with your engineers and with the designers of conveyor equipment—a 3-Way Engineering teamwork that always pays off in higher output at lower cost. Write to address below.

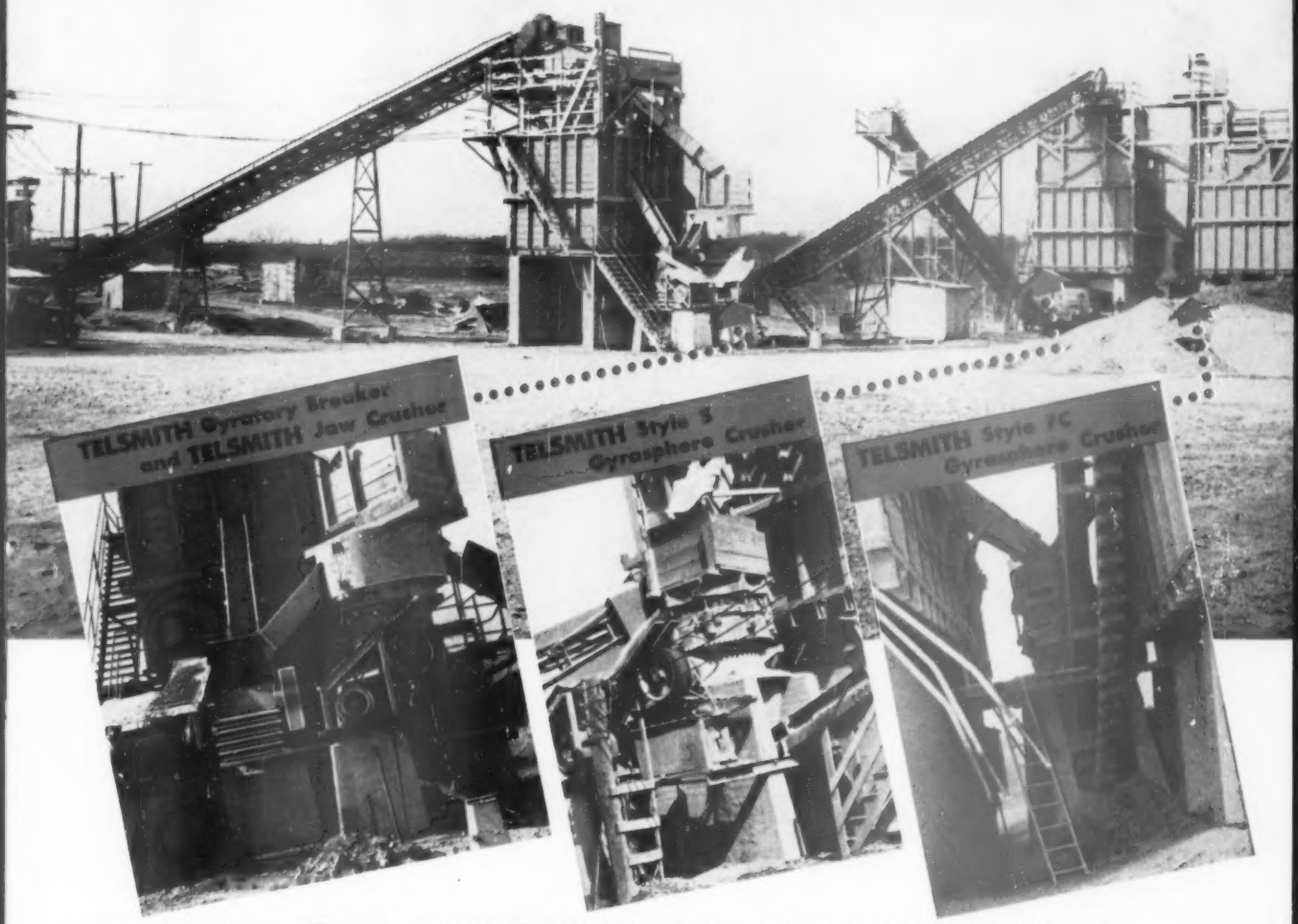
PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

7 SIZES...200 Tons Per Hour

for state highway, bituminous, or ready-mix concrete work


TELSMITH Gyratory Breaker and TELSMITH Jaw Crusher
TELSMITH Style S Gyrasphere Crusher
TELSMITH Style FC Gyrasphere Crusher

TELSMITH ENGINEERED QUARRY PLANT of Valley Quarries, Inc., New Franklin, Pa.

The large demand for crushed aggregate in the lower Cumberland Valley of Pennsylvania is supplied by this Telsmith-engineered quarry plant. The rock is high grade blue limestone. Plant capacity is 200 tons per hour of minus 2½", making all sizes for state highway work, and ready-mix concrete operations, with provisions for producing large tonnages of fine sizes for bituminous work. With their low-cost, efficient operation, Telsmith-engineered plants pay profits. Get Bulletin 266.

Q-26

TELSMITH
Equipment in this Plant

5' x 12' Double-Deck Scalper Screen
13-B Gyratory Breaker
10" x 36" Jaw Crusher
5' x 12' Triple-Deck Pulsator Screen
3' x 10' Double-Deck Pulsator Screen
36 Style S Gyrasphere Crusher
36 Style FC Gyrasphere Crusher
No. 5 Belt Elevator
4' x 10' Triple-Deck Vibro-King Screen

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

51 East 42nd St. New York 17, N. Y. • 211 W. Wacker Drive Chicago 6, Ill. • 713 Commercial Trust Bldg. Philadelphia 2, Pa. • 238 Main Street Cambridge 42, Mass. • Boehck Eqpt. Co. Milwaukee 3, Wis. • The McLean Co., 3525 Lakeside Ave. Cleveland 14, Ohio

Marens Eqpt. Co., 432 Main St., Rochester, Mich. • Clyde Eqpt. Co., Portland 9, Ore., & Seattle 4, Wash. • Mines Eng. & Eqpt. Co., San Francisco 4, Calif.

Rish Eqpt. Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 10, Va. • Interstate Equipment Co., Statesville, N. C.

Nose Brick "Stays Put"

in Rotary Kilns Equipped With

ALLIS-CHALMERS *Air-Cooled* KILN END

Savings in Refractory Brick Will Pay for Air-Cooled Discharge End in 2 to 3 Years!

No end warpage on rotary kilns equipped with this air-cooled discharge end. Hot end stays cool, round and rigid. No shut-downs to replace end brick. In addition to refractory savings, you'll get . . .

MAINTENANCE SAVINGS . . . No loss of valuable production time to replace end brick! Savings in brick, labor and down-time will pay for air-cooled end *several times over* during life of kiln.

AND FUEL SAVINGS . . . Because the discharge end will not distort, the air seal between the firing hood and the kiln continues to be effective after years of service. Fuel savings result when the temperature of the air inside the kiln is not decreased by infiltering cold air. A-3934

Air-Cooled kiln end can be installed on kilns now in service. Get more facts from the A-C representative in your area, or send for Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wis.

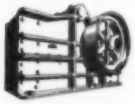
A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

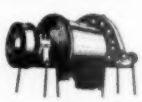
Hammermills

Vibrating Screens



Jaw Crushers

Gyratory Crushers



Grinding Mills

Kilns, Coolers, Dryers

ANNOUNCING

A new Dodge truck parade of power!

NEW! More powerful engines!

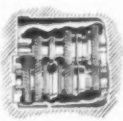
A parade of power! See the new Dodge "*Job-Rated*" trucks at your Dodge dealer's today. A total of 7 big, rarin'-to-go engines, including 3 brand-new power plants with high compression ratios and higher horsepower, greater cooling capacity, increased displacement, twin carburetion available on larger models. Plus famous features like 4-ring pistons with chrome-plated top ring, exhaust valve seat inserts.

In addition, the new Dodge trucks offer outstanding new brakes, new no-shift transmission, and over 50 other new features. See your Dodge dealer for the biggest truck buy on record!

For a truck, ½-ton through 4-ton that fits the job, see the NEW...

NEW! Extra-powerful brakes!

Stop easily on steep grades, fully loaded. Super-safe brakes give silky-smooth braking, reduced driver fatigue, greater load protection . . . new increased stopping ability on 1- through 2½-ton trucks! *PLUS* Dodge's oversize braking surface with Cyclebond linings.



NEW! Truck-o-matic transmission!

New Truck-o-matic transmission . . . available on ½- and ¾-ton models of Dodge "*Job-Rated*" trucks . . . saves shifting, cuts driver fatigue, lets you rock out of snow, mud, sand. Only Dodge offers shift-free Truck-o-matic! *PLUS* famous gyrol Fluid Drive, to lengthen truck life, protect your load.

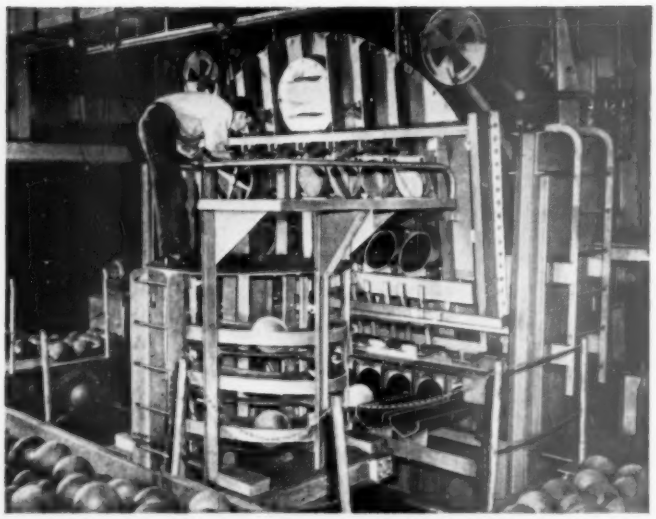
NEW! Over 50 features!

50 ways new! Reinforced cab construction, improved exhaust system, extra-capacity radiators. Tinted glass, heaters with stepped-up heat output available. *PLUS* moistureproof ignition, high-torque capacity starting motors, and other dependability features. See your Dodge dealer.

DODGE "Job-Rated" TRUCKS *Now on display at Your Dodge Dealer's!*

UNIFORM

heat treatment here



Even after years of operation in kiln-firing service, B&W Type E Pulverizers consistently continue to deliver full rated capacity.

The grinding balls make a major contribution to this sustained high operating efficiency. In order to secure maximum strength and wear resistance, the balls of B&W mills are forged of specially selected steels, and are then scientifically heat-treated (one of the furnaces is illustrated above). Finished balls are held to close spherical tolerances.

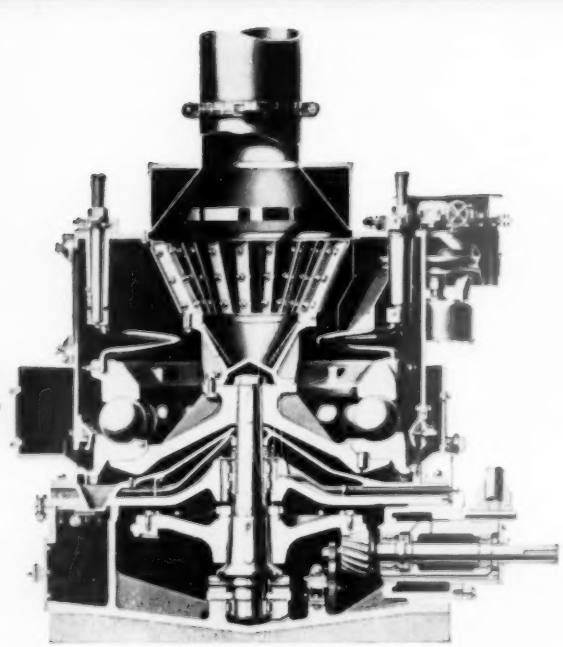
Result: Uniform fineness of pulverized material throughout the long service life of the grinding elements.

The Babcock & Wilcox Company, Boiler Div., Process Equipment Dept., 161 East 42nd St., New York 17, N. Y.

assures years of

UNIFORM

performance here



BABCOCK & WILCOX

C 201

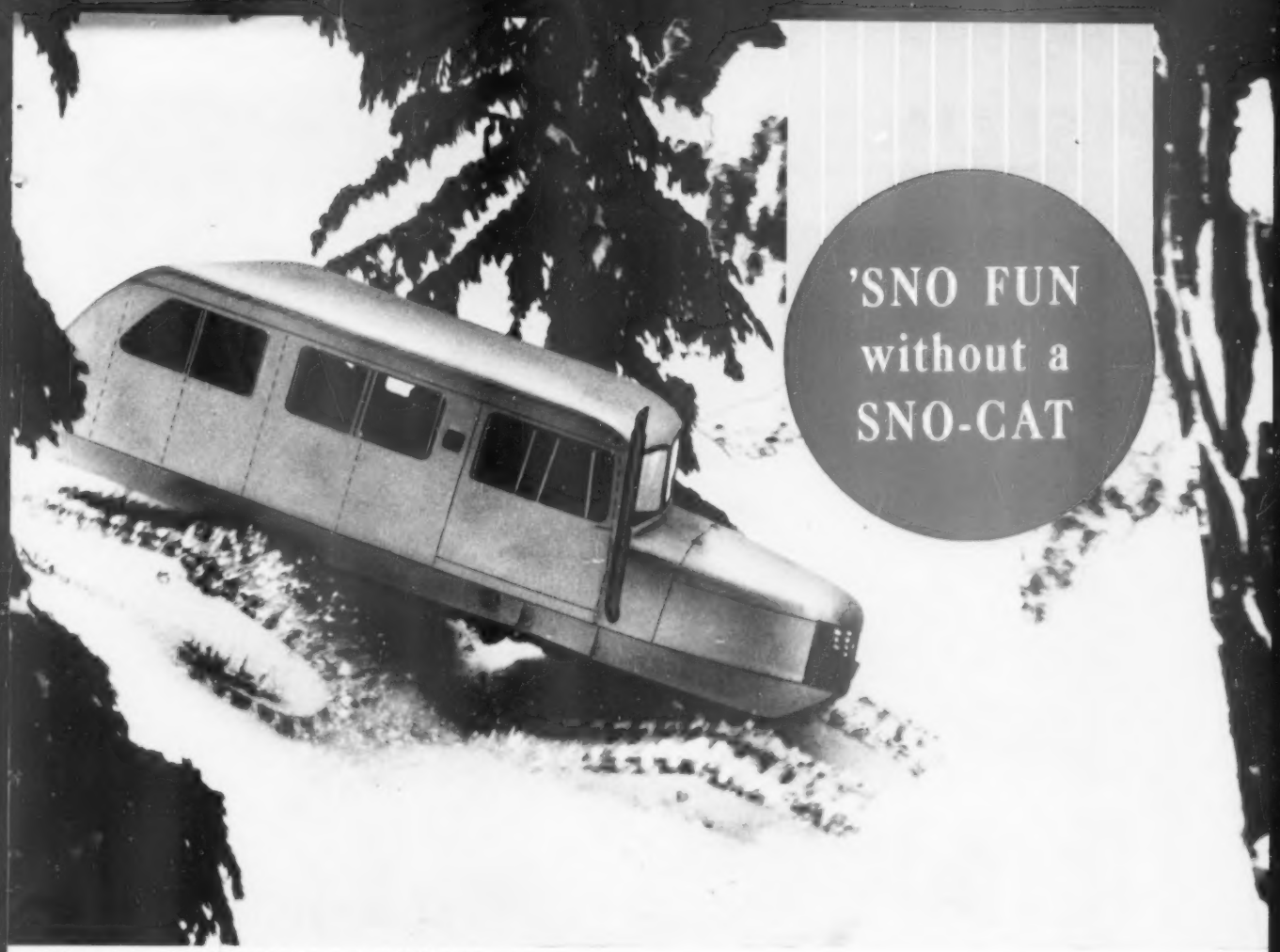


Photo courtesy Tucker Sno-Cat Corporation, Medford, Oregon

Snow, deep and powdery, on his favorite slope may be cause for rejoicing to the skier. But, to the men who must keep 60,000 volts of electricity crackling through ice-crusted lines in the high Sierras, to the men who must keep the lines of communication and transportation open to the West Coast . . . snow in any form spells possible trouble.

When the going is toughest, mountain men turn to their best friend, the Tucker Sno-Cat. These four-pontoon, full-track vehicles carry men and equipment *over the snow*—in minutes—to trouble spots it might otherwise take days to reach.

The 180 horsepower Model 20 Chrysler V-8 Industrial Engine gives the Sno-Cat extreme power without increase in weight, while Chrysler gyrol Fluid Drive and automatic transmission provide smoother, faster application of power to the double-drive axles. This combination is ideal for uses which require a powerful engine that will not stall under heavy loads and at the same time require an engine and transmission protected against the wear and tear of sudden starts and stops.

For greater power and economy in your equipment, check the two new Chrysler V-8 Industrial Engines as well as the seven six-cylinder models. See your Chrysler Industrial Engine Dealer for detailed information, or write: ***Dept. 131, Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

180 horses . . .
man's best friend
in the
wintry high Sierras

CHRYSLER
Industrial Engines

HORSEPOWER WITH A PEDIGREE

SIZING — DEWATERING

GYROSET VIBRATING SCREENS

POSITIVE ECCENTRIC ACTION

The GYROSET Screen has a positive eccentric action giving a full circle throw thruout the length and width of the screen surface. It is of the two bearing type providing minimum moving parts to give the required eccentric action.

The GYROSET in addition is adjustable readily in the field, without special tools, to any one of eight stroke settings ranging from 0 to 3/8".

All moving parts run in a bath of oil and are sealed against the entrance of foreign matter. The mechanism is outside of the deck structure, the only portion within the line of the flow of the material being the shaft housing which occupies only a limited amount of space.

The GYROSET Screen can effectively scalp or size. Due to the adjustable eccentric action, the ability to operate at high speeds and at any degree of pitch or slope, the GYROSET Screen can be readily adjusted as to action to give maximum volume for rough scalping—or it can be adjusted to give the highest possible degree of efficiency in grading and at higher capacity than any other screening unit.

To satisfactorily dewater, a vibrating screen must not only have an action capable of conveying the solids across its length but must have sufficient vertical action to drive the liquid thru the mesh. In other words, sufficient to break the surface tension of the liquid and pass it thru the screening media—in volume.

GYROSET Vibrating screens have that type of action in their adjustable positive eccentric stroke, giving full circle throw motion to the entire screen area.

Gyroset Vibrating screens are made in one to 3 decks and in width from 18" to 72" with lengths from 4' to 16'.

WRITE FOR PARTICULARS

PRODUCTIVE EQUIPMENT CORP.

2926-28 W. LAKE ST. **CHICAGO-12, ILL.**

2 Big Extra Values for you!

...in JOY SILVER STREAK ROCK DRILLS

(1) EXCLUSIVE! CADMIUM PLATING INSIDE and OUT

Cadmium plating prevents rusting of JOY Silver Streak Rock Drills and spare parts while in use or in storage. In addition, the plating forms cadmium oxide under frictional heat and pressure. This so effectively acts as a lubricant that the inner parts will not score, *even if regular lubrication is temporarily neglected!* In addition to assuring a smooth "run-in," cadmium plating allows closer tolerance of precision fitting parts—vital factors in the power and long life of the drill.

(2) EXCLUSIVE! JOY DUAL VALVE "Makes Air Do More Work"

The fast, powerful JOY Dual Valve action results in more and harder-hitting piston strokes per minute, for faster drilling with less air. The right amount of air is admitted behind the piston on the power stroke, and air is excluded ahead of the piston, to exert maximum force on the drill steel. Then the Dual Valve meters just enough air ahead of the piston to return it with a fast, snappy action for the next blow. The air actually does more work!

WBD C 4026

Over 100 Years of Engineering Leadership

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Crusher Jaws Rebuilt with Coast Metals Hard-Facing REMAIN ON THE JOB AFTER 8 YEARS

CM-112 Hard-Facing Welding Rod Increases Jaw Life Per Facing 4 to 1

A large southern mineral company has found the way to keep these crusher jaws on the job year after year. It rebuilds them with Coast Metals Alloy No. 112.

The jaws are used for crushing feldspar. They operate, on an average, 8 hours per day, and crush approximately 22,000 tons annually.

Despite the rugged nature of the operation they handle, and the volume of material processed, these jaws are giving as efficient service today as when they first went to work 8 years ago. Not only has over-all jaw life been greatly increased, but, with CM-112, working surfaces *need only be coated 3 times a year*—in contrast to 12 times previously.

Many other hard-surfacing materials have been tried by the mineral company, but results achieved by CM-112 have proved *outstanding*.

Let us show you how CM hard-facing alloys can meet your requirements. Whether it be bucket teeth, crusher teeth, muller tires, augers—or any other part that must withstand severe wear and tear—and you'll find coating with CM specialized weld rods results in *many times the production obtainable from unfaced units.*

So don't *replace—reface* with CM Alloys. You'll minimize downtime, slash maintenance costs, keep your production running smoothly, step up your output.

COAST METALS, Inc.

Little Ferry, N. J.

COAST METALS (CANADA), LTD., Hamilton, Ontario

PRODUCERS OF SPECIAL HARD-FACING ALLOYS FOR THE ROCK PRODUCTS INDUSTRY

Austin-Western

CRUSHING EQUIPMENT

is now being built at—

Lima, Ohio

New facilities in our vast Lima plant enable us to maintain steady, top-quality production of the following AUSTIN-WESTERN equipment.

- **Portable crushing and screening plants**
- **Stationary crushing, screening and washing plants**
- **Jaw crushers from 10″ x 16″ to 32″ x 40″**
- **Roll crushers—24″ x 16″ to 40″ x 24″**
- **Conveyors • Screens • Feeders, bins and auxiliary equipment**

BALDWIN-LIMA-HAMILTON

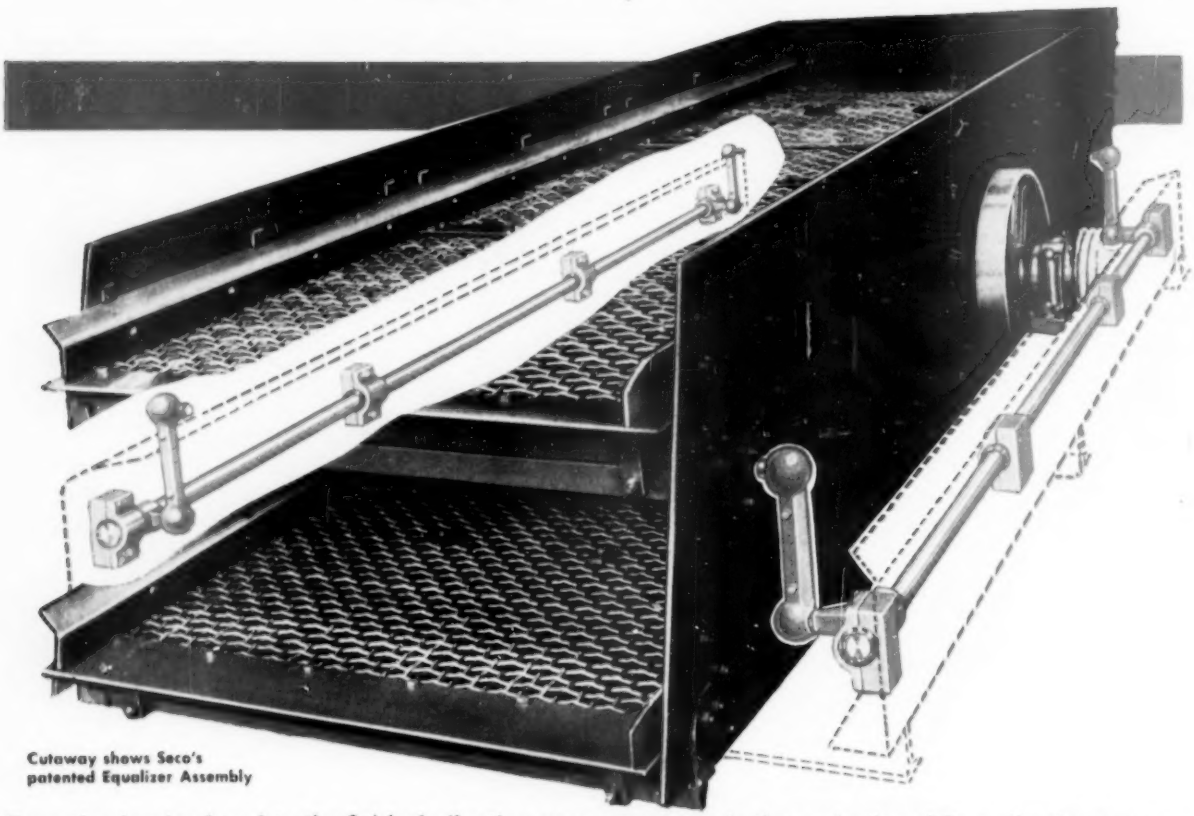
AUSTIN-WESTERN
Crushing, Screening, and Washing Equipment

Construction Equipment Division, Lima, Ohio

LIMA
Shovels • Cranes
Draglines • Pullshovels

SECO VIBRATING SCREENS

are built for fast, accurate screening . .

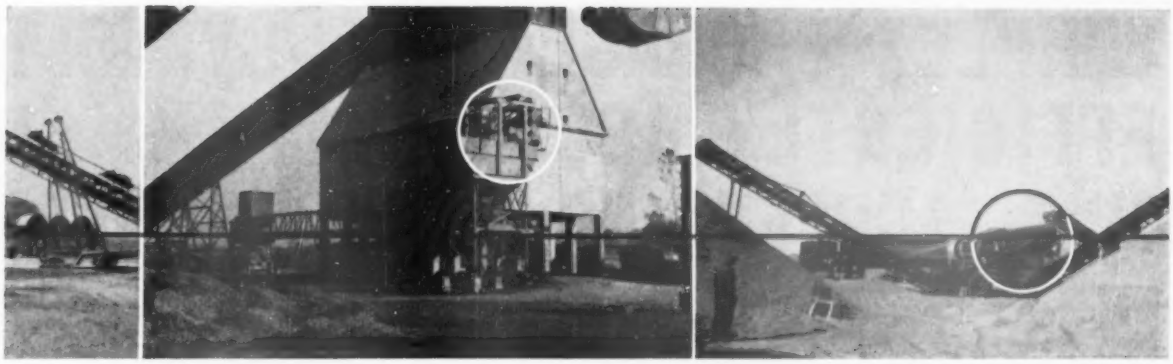


Cutaway shows Seco's patented Equalizer Assembly

From the drawing board to the finished vibrating screen, every step in the production of Seco vibrating screens is in the hands of skilled screening specialists working with finest, modern precision equipment in America's most modern plant devoted exclusively to the manufacture of vibrating screens. This is what's back of the superior on-the-job performance records reported by thousands of Seco Vibrating Screen owners throughout America.

This is why your individual screening requirements will receive interested personalized attention when you call in Seco. Not only will you get the *right* screen or screens for your job, but you'll be set for the long years of fast, accurate screening that's *engineered* and built into every Seco vibrating screen. Write or call Seco today!

First in Engineering . .
First in Performance . .



and proving it every day

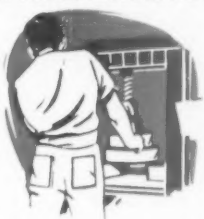
screening everything from Ag-Lime to Rip-Rap

Precision Engineering Gives Operators Big PLUS in Performance

ACCURATELY COMPUTING THE CENTER OF GRAVITY

This is the key to smooth and efficient operation. Every part of the gyrating body is accurately computed as to weight and distance from center.

ASSURING ACCURATE FIT OF BEARINGS IN HOUSINGS



Here again Seco's extra care is evident. This equipment presses the bearings into the housings to eliminate the possibility of the outer race turning in the housing. This contributes to smooth performance and long bearing life.

MACHINING PARTS TO CLOSE TOLERENCES

All machined parts undergo rigid and continuous checks for finish and accurate fit. Skilled machinists use special equipment and precision instruments to insure complete accuracy.

HOW THE DRAW PLATES ARE ACCURATELY FORMED

This huge, heavy-duty power brake is used especially for forming the draw plates to pinpoint accuracy in dimension. This insures proper fit of screen cloth to eliminate screen cloth breakage.

BALANCE WHEELS COMPLETELY MACHINED FOR ACCURATE COUNTERBALANCE

The counterweights on Seco balance wheels are placed in the exact center of the mass of weight, rather than the geometric center. This results in more accurate counterbalancing.

SECO

TRUE CIRCULAR ACTION

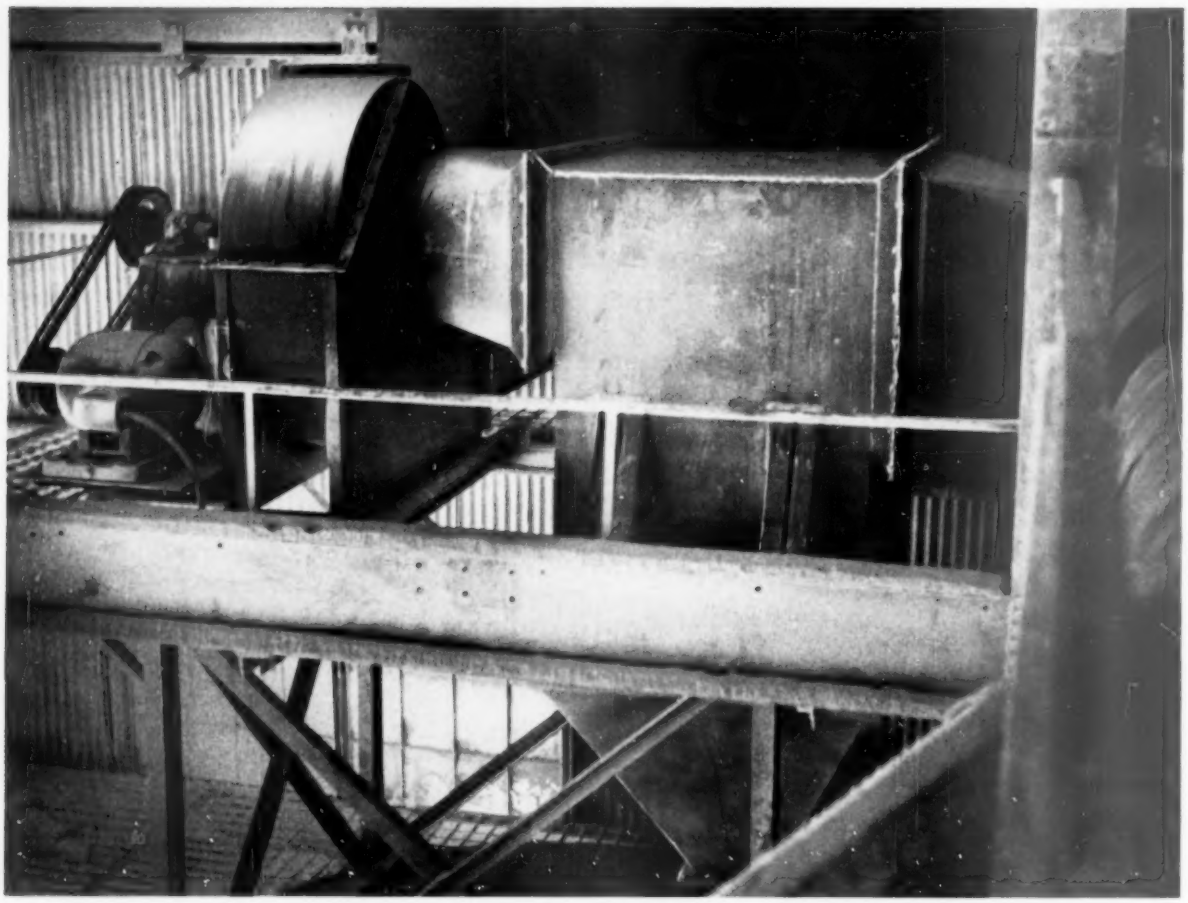
VIBRATING SCREENS

SCREEN EQUIPMENT Co. Inc.

1750 Walden Ave., Buffalo 25, N. Y.

In Canada: United Steel Corp.
Toronto, Ontario

WHIRLEX PACKAGE MULTI-CYCLONE EFFICIENTLY RECOVERS HAMMER MILL, SCREEN AND CONVEYOR DUST



This highly efficient package dust collector consists of an induced draft fan and a collector unit. Each is complete and needs only to be bolted into place at erection. The fan casing, the hopper, the collector casing and the cyclone bodies are 3/16" steel plate. All welded construction is used to insure gas tightness. The completed collector unit forms a box girder of exceptional strength with support structure problems reduced to a minimum. The 9CY18S cyclone tube units are grouped to form a smooth guided inlet for the dust laden gases and a generous hopper is provided to hold the recovered solids. The collector head can be cleaned through special ports without interrupting the operation of the collector. Because of its high efficiency, rugged construction and simplicity of erection, the MTSA-9CY18S package multi-cyclone dust collector is an ideal solution to most dust problems in the rock products industry.

Write today for descriptive literature and the address of your nearest representative.

THE FLY ASH ARRESTOR CORPORATION

BIRMINGHAM ALABAMA

203 North First Street

Telephone 54-6676

WILFLEY
centrifugal PUMPS

30 acres 2 miles

• ***Wilfley Special High Head Sand Pumps*** play an important role in the successful reclamation program of the Hawaiian Commercial & Sugar Co.

• Each year, at the Puunene Mill, 30 to 40 acres of useless, sandy waste land are transformed into productive ground for sugar cane cultivation.

• Soil, removed from mechanically harvested cane by washers, is settled to a sludge of 15% to 25% solids. This sludge, together with a sludge of repulped filter cake, is pumped to the diked waste area. When dry, there remains a 2 to 3-ft. layer of reclaimed cultivable topsoil over the coral sands.

• WILFLEY Pumps, operating on a 24 hour-a-day, trouble-free schedule perform the tremendous task of delivering 300- 500 G.P.M. of cane washer wastes through 2 miles of 6" pipeline to the reclamation area. As a result, wastes which formerly presented a costly disposal problem, are now converted into revenue-producing land.

Wilfley Special High Head Pumps in operation at the Puunene Mill of the Hawaiian Commercial & Sugar Co.

Buy rugged, heavy-duty Wilfley Pumps whenever the job calls for the efficient and economical handling of sludges, slimes, slurries or sands. The new WILFLEY Model "K" Centrifugal Sand Pump, embodying many important mechanical improvements, delivers higher efficiencies, stepped-up production, worthwhile power savings and lower operating costs. Easy interchangeability of wear parts. Low maintenance costs. Every application individually engineered. Write or wire for complete details.

A. R. Wilfley & Sons, Inc.
Denver, Colorado, U.S.A.
New York Office: 1775 Broadway, New York City

Buy WILFLEY for cost saving performance

Companion to the famous WILFLEY Acid Pump

Upper: Reclaimed land under cultivation.
Center: Diked reclamation area.
Bottom: Waste land to be reclaimed.

"QUICK-WAY"

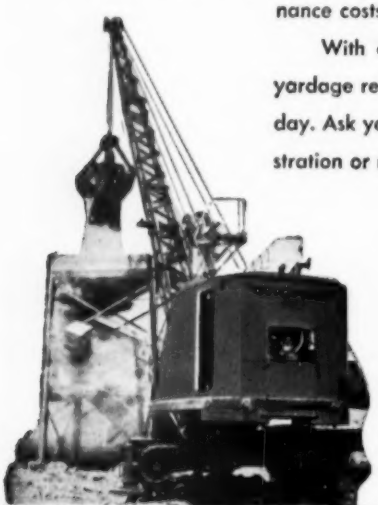
Reg. U.S. Pat. Off.

Speeds Output Increases Profits for ROCK PRODUCT OPERATORS

Whether its moving shot rock, sand, or crushed stone, stripping overburden or charging bins, you'll find the "QUICK-WAY" in a class by itself in the ¼ to ½ yard field.

The "QUICK-WAY" features low center of gravity, works easily over the side, has proper balance for truck operation, gives you easy, fast swinging, plenty of reserve power, rugged all steel construction, numerous parts interchangeable. 4 models, ¼ to ½ cubic yard shovel, clamshell, dragline, backhoe, 3 to 10 ton crane capacity. Truck speeds to and from jobs. Low initial cost. Low maintenance costs. Eight different attachments.

With a "QUICK-WAY" you'll roll up yardage records hour after hour, day after day. Ask your distributor for a free demonstration or mail coupon.



Clinker is handled from the pit to the storage pile and from the storage pile to grinding circuit with a mobile "QUICK-WAY" crane

"QUICK-WAY" Model E dragline with 30' boom loading gravel

"QUICK-WAY" truck shovel, loading sand

"QUICK-WAY" crane with skull cracker attachment eliminates secondary shooting

"QUICK-WAY" TRUCK SHOVEL CO.
Denver, Colorado, U.S.A.

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"QUICK-WAY" TRUCK SHOVEL CO.
Dept. 112 • 2401 East 40th Ave. • Denver 1, Colorado

Please send me complete details on "QUICK-WAY" Truck Shovels —four different models from 3 to 10 ton crane capacity.

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Address _____

City _____ *State* _____

hauling on 5% grades for 15 years!

"We chose PLYMOUTH for stability and endurance"

There's rugged quality built into a Plymouth Locomotive. So say owners and operators who have used them year in and year out. Each has his own way of putting it, but what it boils down to is, "They're mighty, mighty good!"

Take for example this statement by Seymour J. Barr, Manager of the Shenandoah Brick and Tile Corporation at Winchester, Virginia. Mr. Barr says, "What our operator likes best about our Plymouth is its stability on the track and its ease of operation. After fifteen years of operating over grades up to 5% we couldn't ask for anything better than our Plymouth." Mr. Barr is referring to his 8-ton, 36" gauge, gasoline powered model which is used for hauling clay. Whichever Plymouth you choose — gasoline, Diesel, Diesel-electric — narrow or standard gauge — mechanical or hydraulic drive — you can count on it for dependable service and extra economy over the years.

Find out how Plymouth can help cut your costs. Send today for catalog describing 3-ton to 70-ton models! PLYMOUTH LOCOMOTIVE WORKS, Division of The Fate-Root-Heath Company, Dept. A-5, Plymouth, Ohio.

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ALSO MANUFACTURERS OF F-R-H CERAMIC MACHINERY

Longest Rotary Kiln in the Western Hemisphere.
500 feet long, 12 feet in diameter

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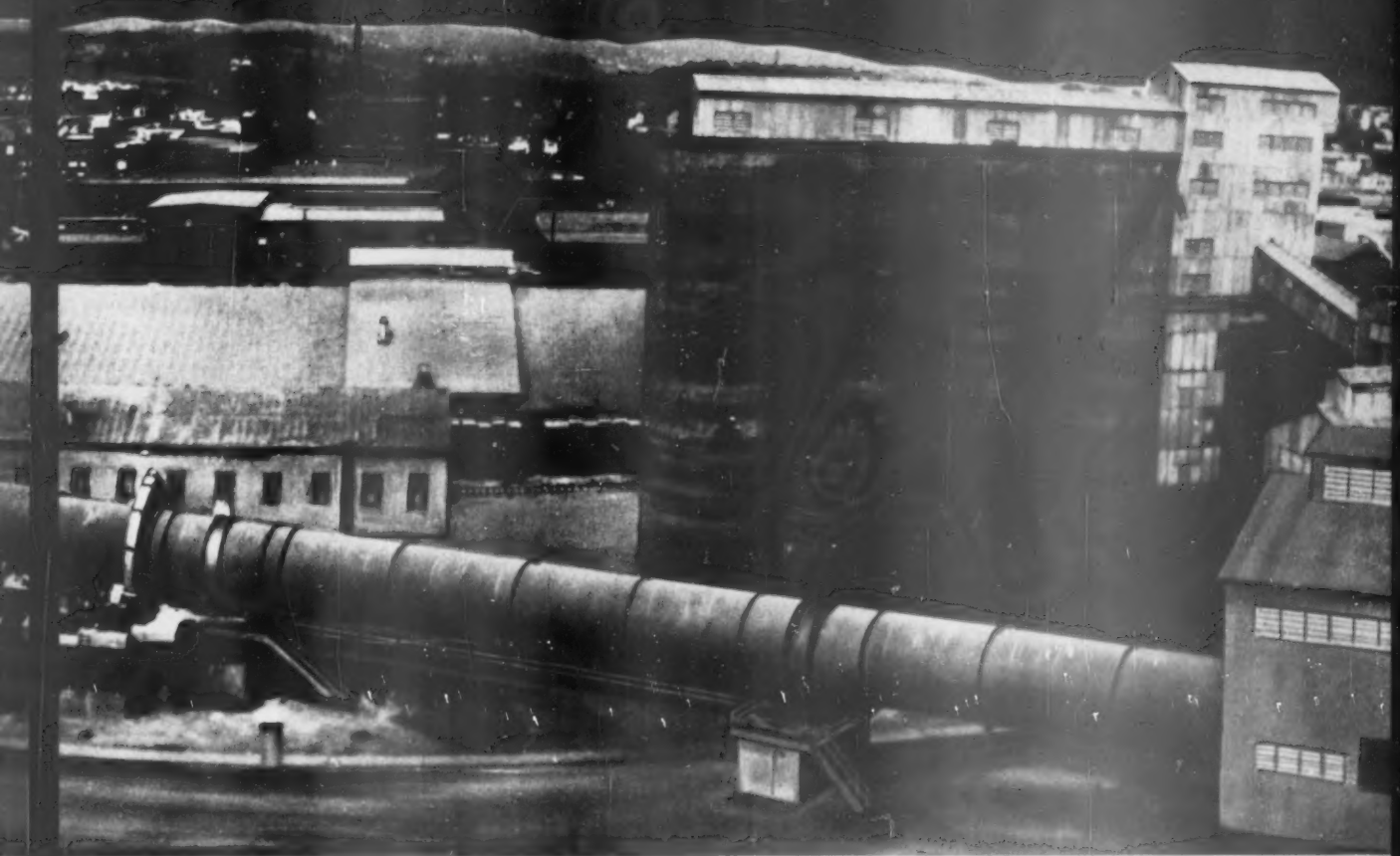
ROTARY KILNS



Designed and Furnished by Smidth for Penn-Dixie at Kingsport, Tenn.

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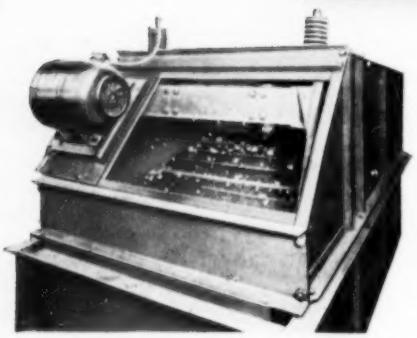
Here is the screen you need for extremely *fine* separations

...the new "SYMONS" V SCREEN



"SYMONS" ROD DECK SCREEN . . . employs a highly efficient screen deck, utilizing individual replaceable spring steel rods. Features low screening cost—big capacity—low maintenance—long life—ideal for moist and sticky materials.

THE "SYMONS" V (vertical) Screen is the newest addition to the well-known line of "SYMONS" Screens . . . and provides extremely fine, single cut wet or dry separations.

Revolutionary in design, and operating with a combination of centrifugal action and gyratory movement, this new screen has proved ideally suited for sand, gravel and crushed stone plants—metallic and non-metallic mining—chemical plants—cement plants—coal preparation plants—and scores of other industrial applications.

Requiring a minimum of floor space, the "SYMONS" V Screen is easily installed, and provides fully enclosed construction to assure dustless operation—yet access to the screen is simplified through easily removable covers. *Write for further details.*

NORDBERG MFG. CO., *Milwaukee, Wis.*

5252

"SYMONS" . . . a Nordberg trade mark known throughout the world

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

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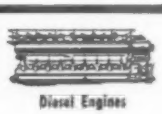
"SYMONS" Primary Crushers

Grinding Mills

Mine Hoists

"SYMONS" Vibrating Bar Grizzlies and Screens



Diesel Engines

The toughest three-letter word in business

"But . . ."

The word a man uses when he starts by nodding yes and ends by saying no.

"But . . ."

The word on a Multiwall buyer's tongue just after he's said, "Well, as long as we order by specification, I guess one brand's as good as another . . ."

Executives who purchase more than 85 per cent of all Multiwalls have a big BUT there.

They testify* that there are many other considerations. Among the most important, the reputation of the manufacturer. They judge him by his record of reliability, his effort to meet delivery dates, his willingness to give a full measure of service.

We welcome the challenge of the toughest three-letter word in business. We believe the attention big buyers of Multiwalls pay to the *extra* factors—dependability, for instance—has a lot to do with their giving Union a greater proportion of their Multiwall business.

More so every day . . .

IT'S UNION FOR MULTIWALLS

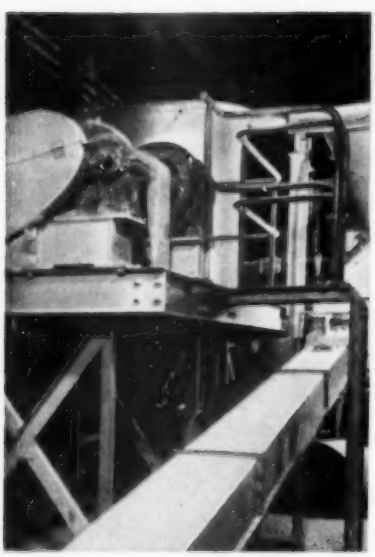
*August, 1951 research study.

UNION BAG & PAPER CORPORATION • NEW YORK: WOOLWORTH BUILDING • CHICAGO: DAILY NEWS BUILDING

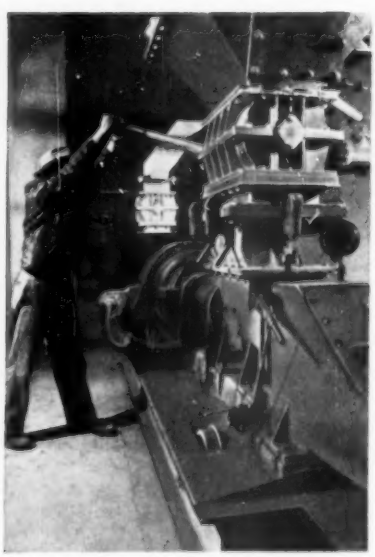
1 LIMESTONE IS DELIVERED in cars from quarry to primary crusher and hammermill. G-E powered crane is used by operator to keep rock from jamming in crusher.

2 CRUSHED ROCK IS CARRIED to storage by a 30-inch, 1200-foot-long conveyor. This sturdy G-E 60-hp motor starts the fully loaded belt without difficulty.

Modern materials handling helps



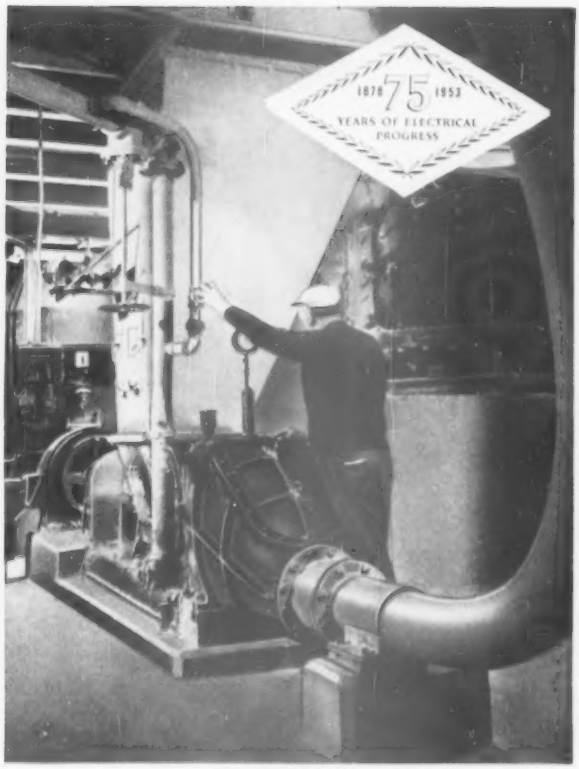
5 PULVERIZED STONE is fed to kilns by screw conveyors powered by a G-E selsyn drive system which coordinates screw speed and kiln rotation.



6 FINISHED CEMENT is pumped to packhouse by portable Fuller-Kinyon pumps. G-E 200-hp drives enable each to deliver 600 barrels per hour.

7 CONVEYOR DELIVERS filled bags to dock for loading into cars. Compact G-E gear-motor transmits maximum torque, provides uniform speed.

3 **ROUGH BLENDING** is done in storage by two G-E powered heavy-duty d-c cranes which dump selected rock into hoppers for delivery to the raw-grinding mills.



4 **FROM GRINDING MILLS** pulverized stone is conveyed through a 10-inch pipe to blending bins. Fuller-Kinyon pump, G-E powered, pumps 120 tons per hour.

Universal Atlas reach peak output

G-E equipped system at Hudson, N. Y. cement plant keeps operation continuous from quarry to pack-house

Every cement plant has the same kind of materials-handling problem that Universal Atlas Cement Co. faced at their Hudson, N. Y. plant: *to minimize interruptions in the flow of materials being processed.*

Here's how Universal Atlas achieved this goal: their engineers designed a materials-handling system made up of the most up-to-date equipment available. Plans included standby equipment and materials stockpiles at strategic locations to provide for necessary equipment maintenance. Then, reliable, long-life G-E drives were used for the entire system. The success of this carefully planned program is evident today when record production flows smoothly through the plant.

A modern materials-handling system integrated with production operations can eliminate bottlenecks and increase production in your plant. To help you achieve these goals, G-E application engineers are ready to work with you and your equipment manufacturer to solve electrical problems involved. Contact your nearest G-E Apparatus Sales Office today.

Most efficient way to modernize shown in new PROGRESSIVE MECHANIZATION program

To help you set up a step-by-step plan for bringing plant operations to peak efficiency, G.E. has developed the new *Progressive Mechanization Program.* Ask your G-E apparatus representative for details, or write to General Electric Company, Sect. 658-11, Schenectady 5, N. Y.

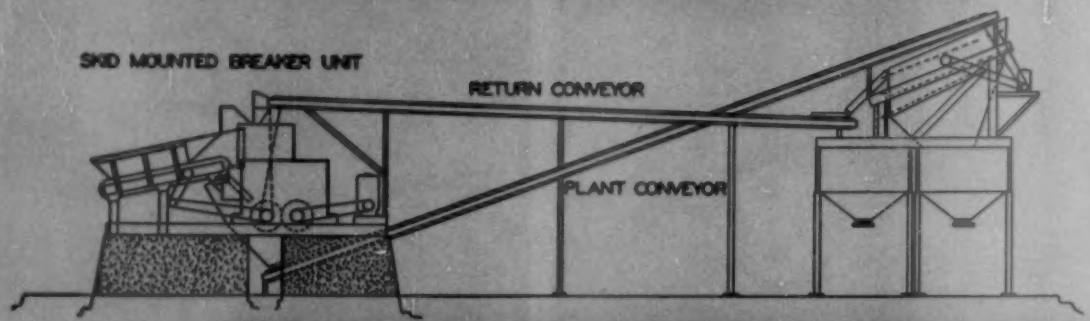
Engineered Electrical Systems for the Rock Products Industry

GENERAL ELECTRIC

CONTROLLED IMPACT ACTION

Get BIG PLANT TONNAGE

at ROCK BOTTOM COST!



with a PMCO IMPACT MASTER HEAVY DUTY IMPACT BREAKER

Patent Pending

Step into big profit operations with minimum plant investment! A PMCO Impact Master setup eliminates secondary crushers and auxiliary equipment . . . saves on power, labor and maintenance costs . . . gives you top speed production of top quality aggregate.

With the PMCO Impact Master's high ratio of reduction, the complete crushing job is done in one fast controlled breaking operation. The breaking is accomplished by rigidly mounted rotor hammers, producing a top quality, uniform gradation cubical aggregate. Finished product size is easily controlled, and simple mechanical adjustments change the percentage of sizes. You can use the PMCO Impact Master for producing road building and concrete aggregates, and adjust it for the simultaneous production of aglime when desired.

PMCO Impact Masters have capacities up to 500 tons per hour. Let us give you profit-making details on the size that meets your requirements. Write today.

PMCO Impact Master Division, Universal Engineering Corporation, 625 C Avenue N. W., Cedar Rapids, Iowa

UNIVERSAL ENGINEERING CORPORATION division of PETTIBONE MULLIKEN CORP.

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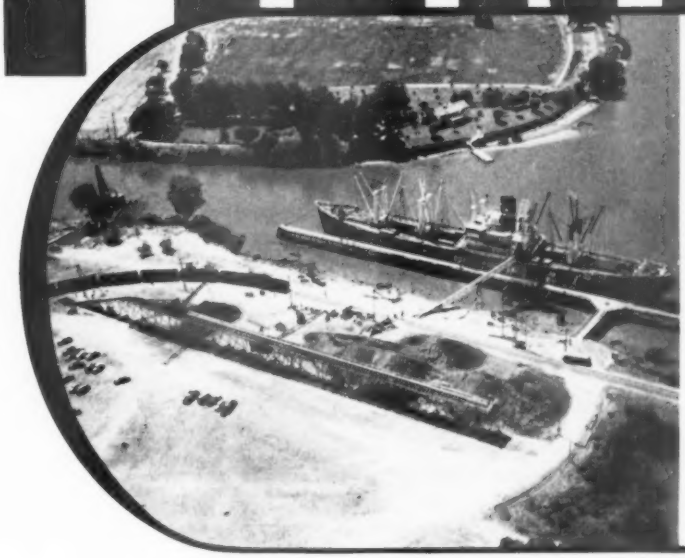
Industrial rubber products especially built for LONG SERVICE

PIONEER



Pioneer Belting loads 800 tons of ore per hour at new terminal

This new terminal is located at the Port of Stockton and owned by the Stockton Bulk Terminal Company. J. H. Pomeroy Corporation were the builders.

Stockton (California) has put itself firmly on the ore shipping map with a new bulk loading plant that is probably the fastest on the Pacific Coast. It reduces the time for loading a ship from five and one half days to only one day. One conveyor system carries the ores from the railroad spur to the distributing belts, which can reach any part of the 100,000 ton storage area. Another conveyor belt loads the ships.

For long-term economy and rugged outdoor service, Pioneer belting is used in this installation. . over 2,000 feet of 36" belting built especially for handling many materials—iron and phosphate ores, magnesite, coal, salt, pyrites, and others.

Whether in California, Florida or the states between, Pioneer Industrial Rubber Products have earned an unusual reputation for *service.*

Your nearest representative will be glad to tell you more about them.

PIONEER RUBBER MILLS

Pioneering in rubber since 1888

BRANCHES: CHICAGO • DALLAS • LOS ANGELES MILWAUKEE • ST. LOUIS • SAN FRANCISCO

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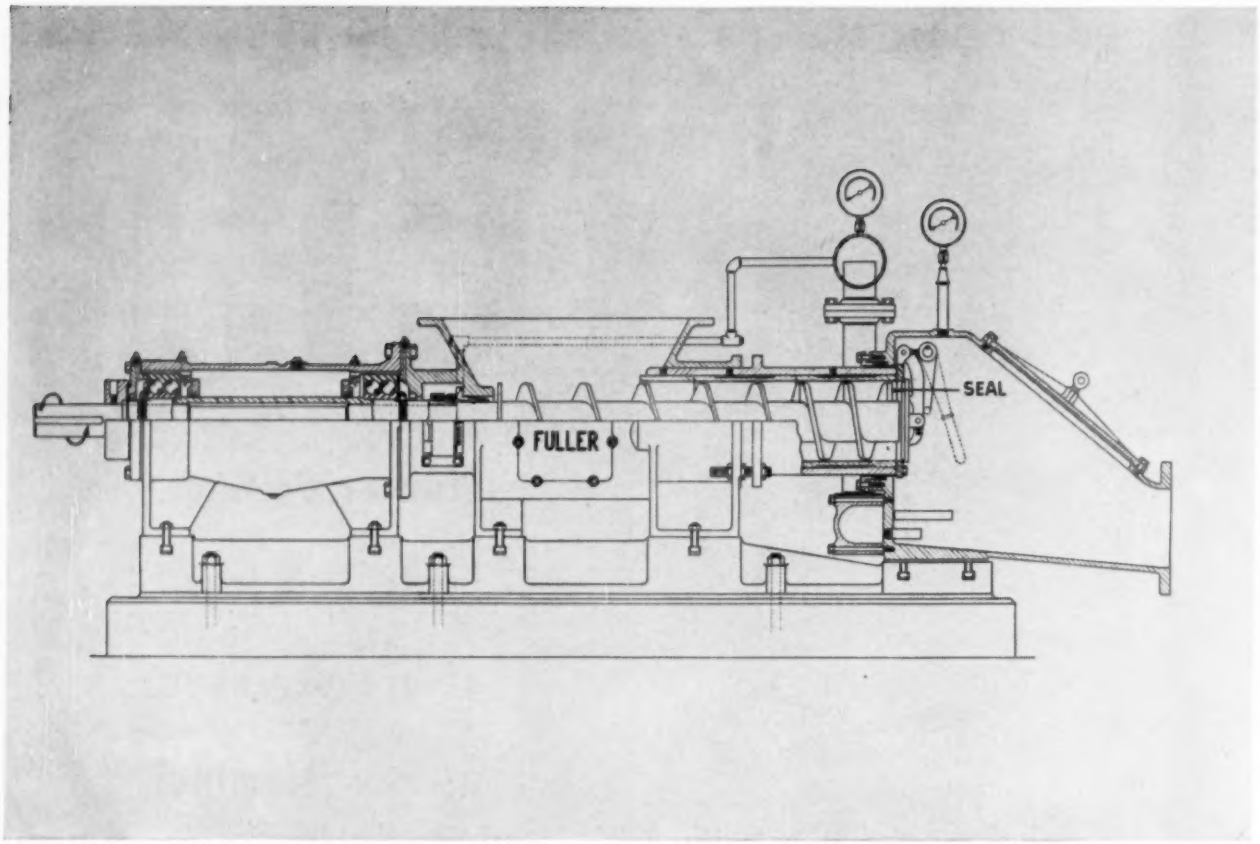

let's take a look inside . . .

FULLER-CONVEYING

Drawing is a part section of a Fuller-Kinyon Pump—and here is how it operates: Material to be conveyed enters the receiving hopper by gravity and is advanced through the barrel of the pump by the impeller screw. As the material advances (from left to right) through the barrel, it is compacted—to prevent blow-back—by the decreasing pitch of the impeller screw flights and a variable space provided between the last flight and a check valve. The material then enters the mixing chamber, through the check valve, where the material is fluidized by compressed air introduced through a series of air-jets, and in this fluid state enters the transport line where it is advanced as a dense column at a low velocity.

Fuller
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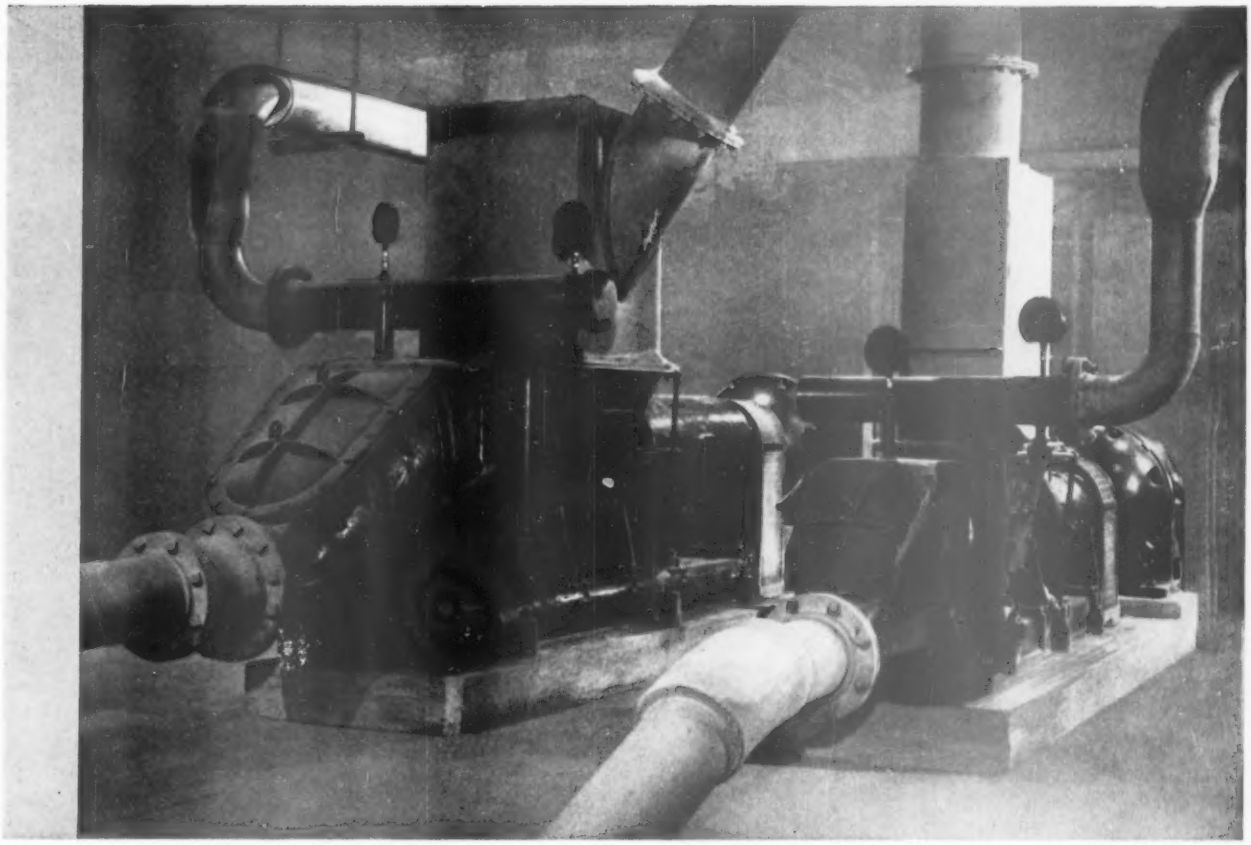
1951
P-148T

DRY MATERIAL CONVEYING SYSTEMS. . . CLINKER COOLERS. . . COMPRESSORS AND VACUUM PUMPS. . . FEEDERS AND ASSOCIATED EQUIPMENT



see how this pump works

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Fuller-Kinyon Systems have proved their merit in hundreds of plants as the most efficient, speedy and dependable way of moving cement and other dry, pulverized materials from mills or separators to storage bins and silos—from storage to packer bins, cars, trucks, ships and barges—from cars to storage and process—for discharging self-unloading cement ships. Fuller-Kinyon Pumps are available in many sizes, both stationary and portable, for both manual and remote-control operation. Complete information on Fuller-Kinyon Pumps is yours for the asking. Write now for Bulletin FK-25A, Fuller Company, Catasauqua, Pennsylvania.

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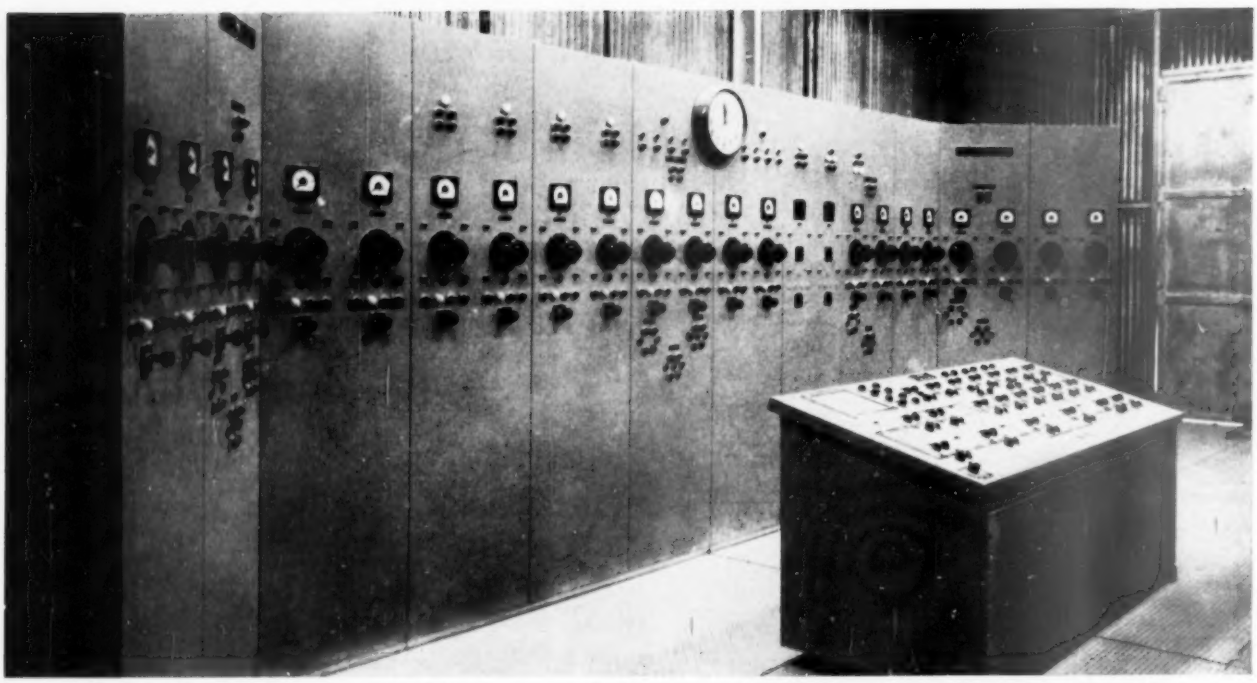
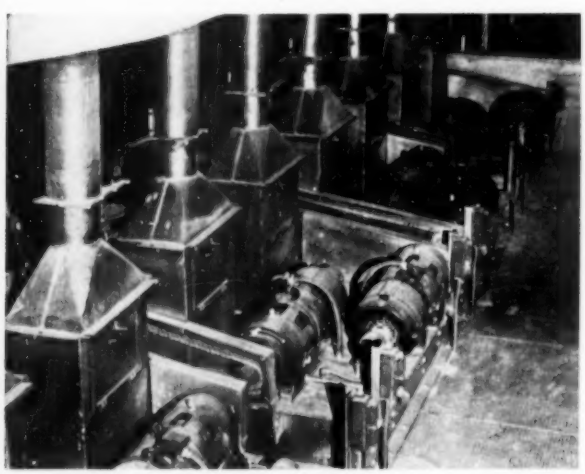
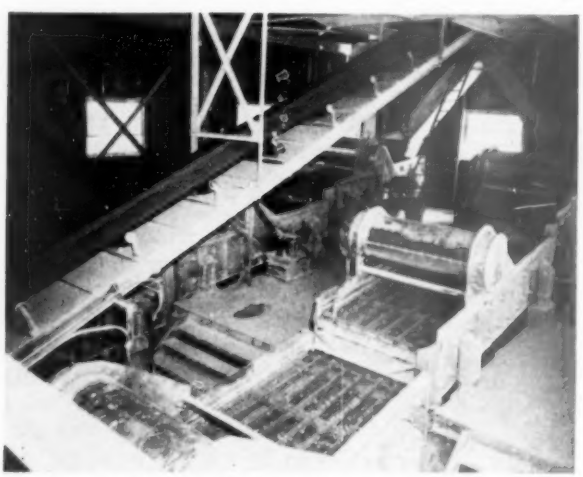
Central Control...



Central Control Room operated by one man: desk type bench board controls flow of stone through screening and blending plant—vertical panel board controls all blending and loading operations.



Drive end of 24" x 4'-6" unit type blending belt feeders showing variable speed gear motor drives and dust collection.



South end showing battery of 5' x 14' double deck Robins Eliptex Screens producing all sizes under 1".

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Featured In New Dolese Coordinated Stone Plant

At Richards Spur, Okla., the new fully coordinated stone plant of Dolese Bros. Co. is accurately blending up to 750 tons of limestone per hour under the central control of only one man.

Here, all types of crushed limestone products, from derrick stone to agricultural limestone are produced and aggregates are automatically blended to meet an infinite variety of specifications. Its operation is so flexible that it can comply with any known specifications set by Federal, State, County or local agency, public or private. Its design is so flexible that it can meet almost any changing conditions to be encountered in the future.

The many problems encountered in the visualization and planning of this plant represented a challenge to engineering and manufacturing ingenuity and the challenge has been met through the combined efforts of the staffs of Dolese Bros. Co., and Hewitt-Robins, Inc.

General view of screening and blending station looking southwest showing main building, loading bins, main conveyor and recirculating conveyor to secondary crushing station.

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CITY PO ZONE STATE

AT THE

M. L. KERNAN QUARRY

A new 1-yd. Lorain shovel, Model 50-I, has just been added to their 24-year old fleet. It is shown at right removing overburden and loading trap rock after blasting. When handling overburden, as shown in the photo, the "50" moves from 1,000 to 1,200 yards per day. The line up of Lorains in the photo below includes this new "50", along with other Lorains the M. L. Kernan Quarry has purchased over the past 24 years. All machines are still working today.

A QUARRY STORY—24 YEARS OLD

Way back in 1929, the M. L. Kernan Quarry in South Orange, New Jersey, bought the machine shown at left in photo. In the 24 years that followed, they have consistently relied on dependable Lorain performance in their stripping and quarrying operations. In the large photo, you will see the parade of 4 Lorains that have come through years of rough-tough use, digging thousands upon thousands of yards of material. According to Louis E. Kernan, all of these Lorains are in excellent operating condition.

Past performance was the reason the M. L. Kernan Quarry recently selected a Lorain again when more production capacity was needed. In scores of quarries, through many years, Lorain quality has stood the test of rock and time. It's a money-saving story that you should know . . . and you can get it from your nearby Thew-Lorain Distributor. He can offer you shovel capacities from 1/2 to 2-yd. classes, crawler or rubber-tire mountings, 6 interchangeable front end types. It is the world's most complete shovel-crane selection.

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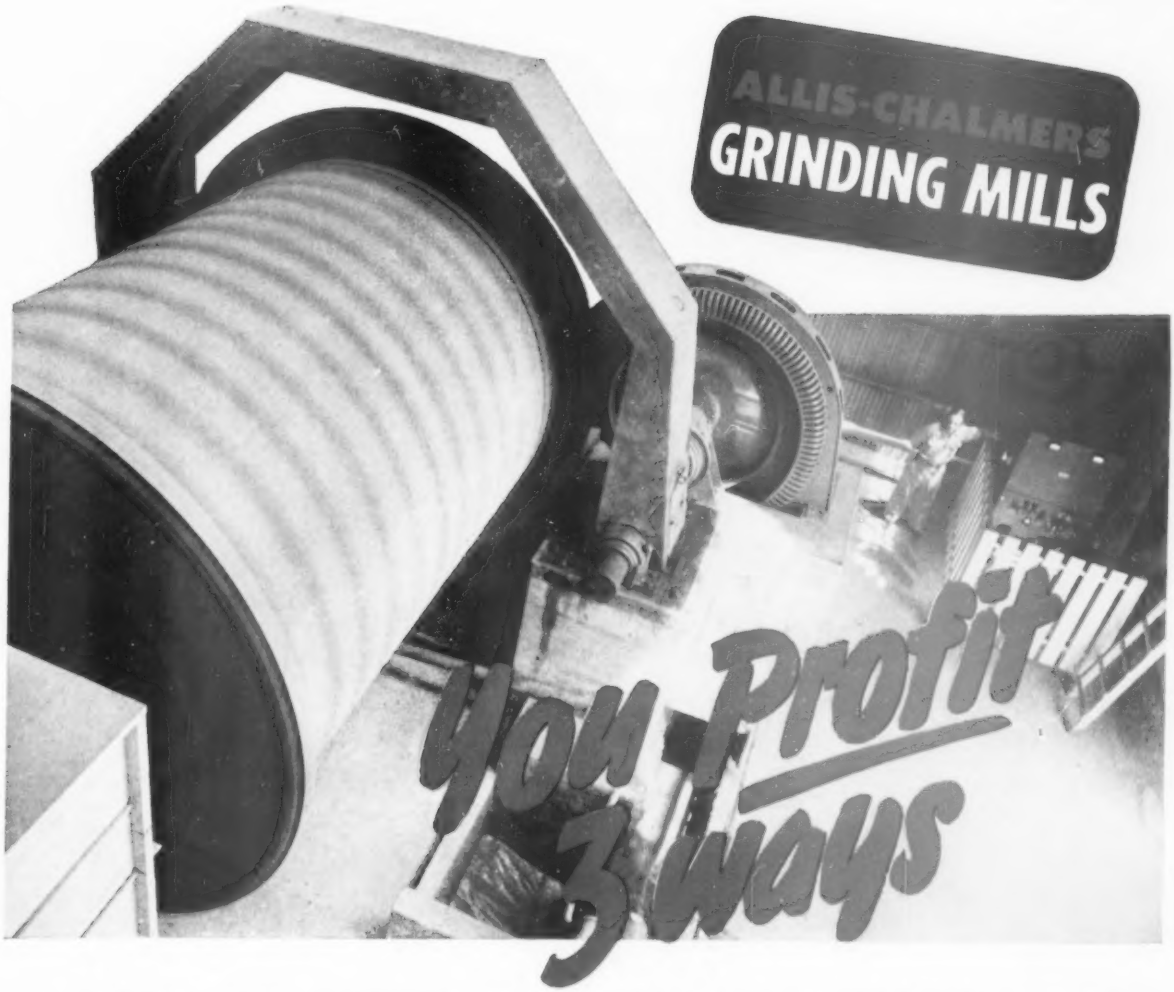

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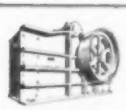
Gyratory Crushers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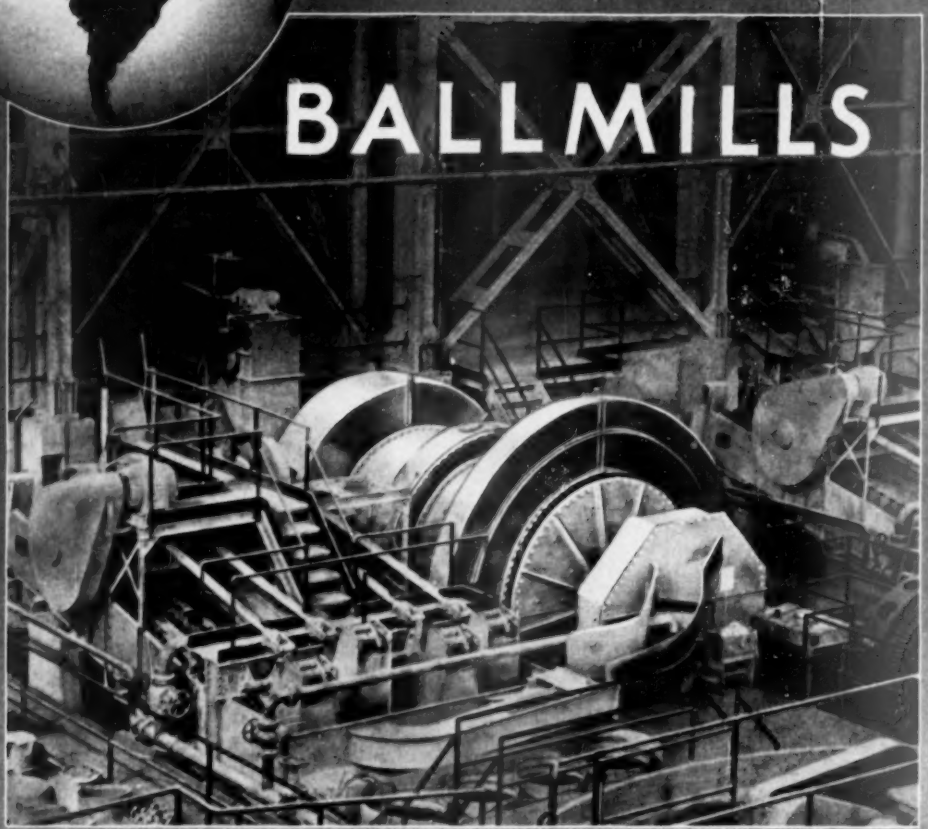
BALLMILLS



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"WE HEAR..."

January, 1953

National production of goods and services reached the highest level in history during the third quarter of 1952, according to Commerce Department reports. At this time, it rose to an annual rate of $343.4 billion, which was $800,000,000 above the second quarter figures and $2.9 billion above the first quarter. National production for the entire year of 1951 amounted to $329.2 billion. In terms of the value of the 1939 dollar, however, the 1951 figure shrinks to $167.3 billion. National production in 1939 was $91.3 billion.

* * * * * * * * *

Construction outlays for the first ten months of 1952 amounted to approximately $27,000,000,000, or 4 percent above the corresponding ten months of 1951. After adjustments for price changes, however, building activity appeared at about the same level for both years, as reported by the Commerce and Labor Departments. Expenditures for construction put in place during October, 1952, totaled $3,000,000,000, a decrease of $100,000,000 from September. October was the fifth consecutive month in which expenditures for new construction were 5 percent or more above the corresponding 1951 month.

* * * * * * * * *

Total world output of natural rubber totaled 1,157,500 long tons in the first eight months of 1952, a 9 percent decrease from the 1,275,000 tons produced during the same period of the previous year. World consumption of natural rubber for the 1952 period totaled 955,000 long tons, compared with 1,022,500 tons for the same period in 1951. World output of synthetic rubber was estimated at 605,000 long tons for the first eight months of 1952, compared with 584,000 tons for the comparable 1951 period. Consumption of synthetic rubber in the 1952 period was 575,000 tons, compared with 530,000 tons for the 1951 period.

* * * * * * * * *

A serious shortage of freight cars has been reported in the Midwest and other areas, due partly to the current heavy industrial activity, and partly to the fact that the railroads are said to be scrapping old cars faster than they are replacing them. A few industrial traffic men have termed the shortage "the most serious" they have ever experienced. The Shippers Advisory Board has recommended a higher penalty demurrage charge on shippers who detain freight cars too long and a higher per diem rental rate for railroads using "borrowed" cars from other railroads. Trucks are being used wherever possible to compensate for the freight car shortage, but there is also a shortage of trucks in some areas.

* * * * * * * * *

According to an address delivered by a leading steel company executive, new technological developments, which will revolutionize the steel industry, are in the making. It is claimed that the new developments, which will include the use of ultrasonic energy and the use of controlled beams of electrons in steel production, metallurgy and fabrication, will reduce the cost of production, increase the strength of steel approximately ten times, and will also provide "improvements in steel hardenability, tensile strength, machinability and resistance to fatigue."

* * * * * * * * *

Machine tool builders were recently authorized by the U.S. government to sell a larger portion of tool output to civilian users in order to keep the industry's production at high levels. Military orders for machine tools are dwindling. Previously, 70 percent of the output was slated for defense, leaving only 30 percent for civilian users. The new order allots 60 percent for military and 40 percent for civilian purposes.

WE HEAR

Construction contract awards in the 37 states east of the Rockies totaled $14,048,749,000 for the first ten months of 1952, or 3 percent above the corresponding period of 1951, according to an F. W. Dodge Corp. report. Residential awards of $5,690,495,000 were up 5 percent; non-residential awards of $5,524,488,000 were down 6 percent; and heavy engineering awards of $2,833,766,000, showed a 25 percent gain. Total construction awards for the month of October amounted to $1,300,958,000, a 36 percent decrease from September, but a 24 percent increase over October, 1951.

* * * * * * * * * *

A police investigation of a theft and damage complaint of an eastern concrete company revealed that a large concrete mixer had been damaged and that gasoline, stolen from a storage tank, had been replaced with water.

* * * * * * * * * *

A minor "gold rush" occurred recently in Pyongtaek, Korea, area. "Prospectors" chipped away at the highways after it was discovered that they were surfaced with refined gold ore. The roads, built by Army engineers a year ago, had supposedly been surfaced with gravel obtained from an abandoned slag pile but, instead of gravel, the material turned out to be gold ore, valued at $60,000. The error was discovered when a Korean mine owner demanded $60,000 for the loss of his gold. The Army reportedly settled for $20,000.

* * * * * * * * * *

A suit charging unfair labor practices against four potash companies has been filed by the International Association of Machinists, as recently reported in Engineering and Mining Journal. The suit accuses the potash companies of illegal aid and assistance to the United Mine Workers Union which was labeled a "company-dominated union." The four companies named in the suit are said to be operating without union contracts.

* * * * * * * * * *

The railroads, since World War II, have scrapped approximately 475,000 worn-out freight cars, replacing them with an equal number of new cars, but of greater capacity, as reported by Missouri Pacific Lines. Capacity of the average freight car increased from 51.1 tons in 1945 to 52.9 tons in 1951.

* * * * * * * * * *

The use of talc in treating heart ailments is reported to be gaining recognition in the medical profession. Heart specialists have indicated there is growing evidence that a "talc powder" surgery method is effective as a preventive as well as a remedy for coronary ailments. The method involves the injection of sterile talc powder into the diseased heart after its surrounding sac has been cut open. This method is said to supply the patient with an auxiliary fuel line in case the first one becomes clogged or constricted.

* * * * * * * * * *

U.S. Steel Co. reportedly has taken a 99-year lease and option on 11 fluorspar claims in southeastern Ravalli county, Mont., with an advance royalty payment of $100,000. The ore is said to be of high grade.

* * * * * * * * * *

Available supplies of fertilizers for 1953 crops are expected to be about 12 percent greater than during the past two years, according to predictions by the Department of Agriculture. The 1953 forecast includes 1,585,000 tons of nitrogen, an increase of about 11 percent; 2,465,000 tons of phosphates, an increase of 12 percent; and 1,850,000 tons of potash, an increase of 17 percent. Shortages are likely to be greatest in nitrogen.

* * * * * * * * * *

A midwestern cement plant, idled over two weeks by the collapse of girders over grinding machinery, is now back in full operation. Repair crews worked 24 hr. a day to repair machinery damaged in the accident. No injuries were reported.

* * * * * * * * * *

Contract awards for heavy construction, nationally, totaled $14,579,243,000 for the first 47 weeks of 1952, compared with a total of $12,596,849,000 for the comparable period of 1951, as reported by Engineering News-Record. Commercial building continued its upward trend, with awards running 22 percent above the corresponding 1951 period.

THE EDITORS

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FOR

CEMENT · LIME · ORE

Smidth Machinery has been supplied to over

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INCLUDING

1000
Rotary Kilns

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WIDE CHOICE OF COMPONENTS AND ACCESSORIES

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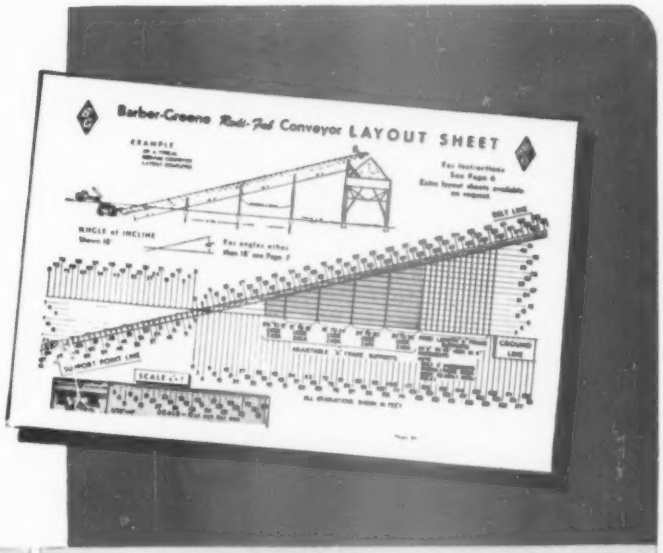
YOU CAN SELECT YOUR OWN CONVEYOR

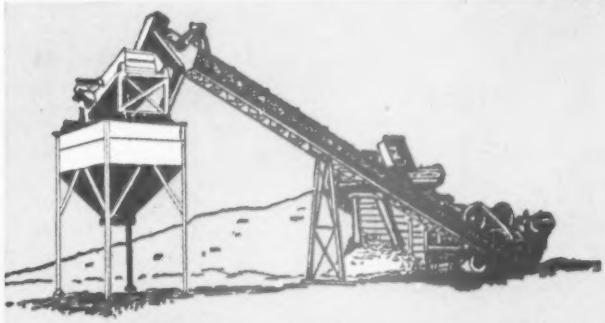
While a Barber-Greene representative will gladly assist you in selecting your Redi-Fab Conveyor, you can actually do it yourself. Right out of the catalog. No knowledge of engineering is required. All you need to know is the material to be handled, the capacity you require and the elevation. All other information, including an easy-to-use layout sheet, is right in the catalog.



Typical Redi-Fab Conveyor elevating truck-delivered material to a washing and screening plant. Feeders are available, driven from conveyor foot shaft.

Stock-piling from truck. Redi-Fab drive options permit locating power unit near foot end to allow maximum overhang at head end.

Working with B-G car unloader, Redi-Fab Conveyor charges bins with coal and coke. Application is common for handling aggregates, bulk chemicals, etc.



Crusher discharge is elevated to vibrating screen for delivery to bins. Redi-Fab drives available to operate screen and conveyor from same power unit.

280

Barber-Greene

Aurora, Illinois, U. S. A.

...a *Crushing Record* by:
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with his DIAMOND "66"
ROTOR-LIFT PLANT

3/4" minus material...

20 to 40% crush...

208 yds. per hr. average!

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Diamond Iron Works, Inc.
1728 Second Street North
Minneapolis, Minnesota

Gentlemen:

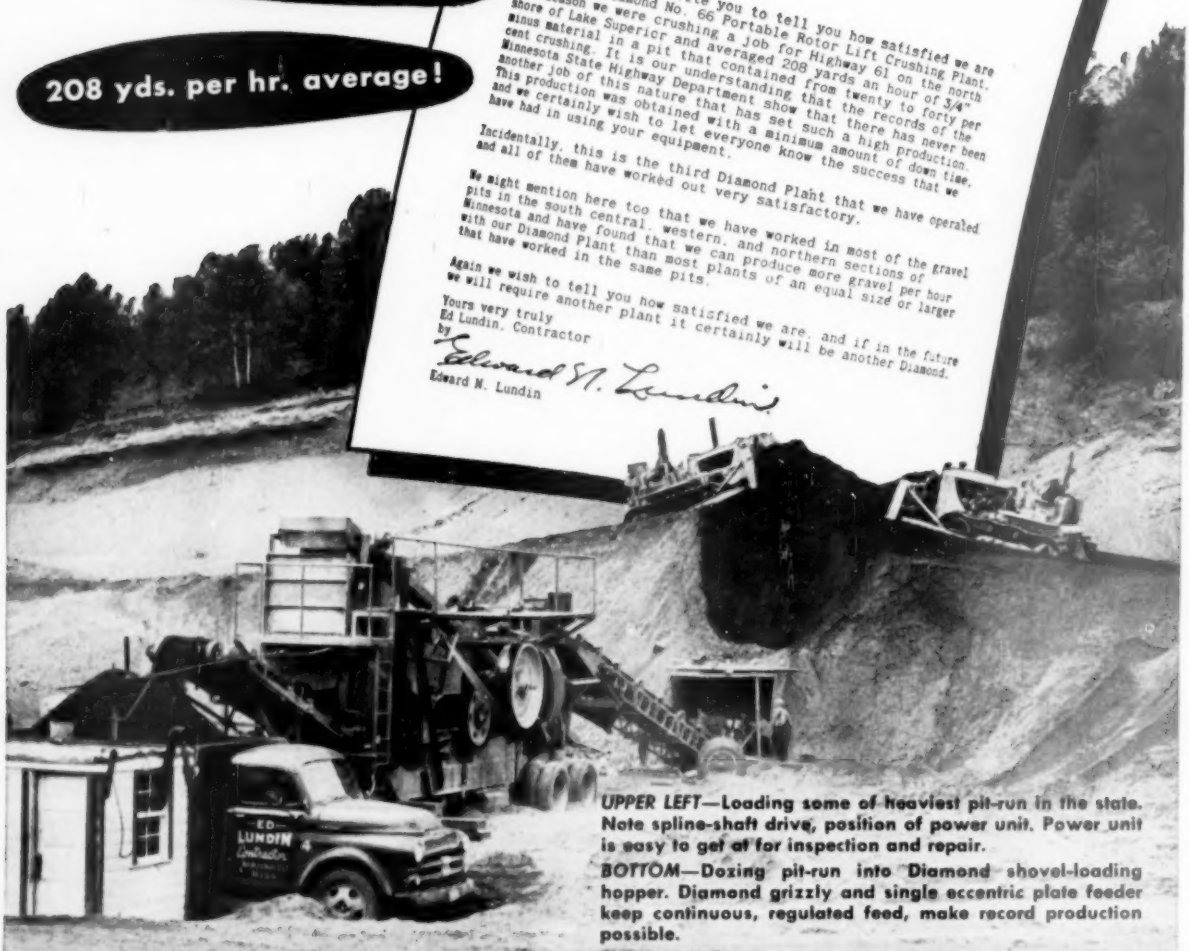
I could not help but write you to tell you how satisfied we are with our new Diamond No. 66 Portable Rotor Lift Crushing Plant. Last season we were crushing a job for Highway 61 on the north shore of Lake Superior and averaged 208 yards an hour of 3/4" minus material in a pit that contained from twenty to forty per cent crushing. It is our understanding that the records of the Minnesota State Highway Department show that there has never been another job of this nature that has set such a high production. This production was obtained with a minimum amount of down time, and we certainly wish to let everyone know the success that we have had in using your equipment.

Incidentally, this is the third Diamond Plant that we have operated and all of them have worked out very satisfactory.

We might mention here too that we have worked in most of the gravel pits in the south central, western, and northern sections of Minnesota and have found that we can produce more gravel per hour with our Diamond Plant than most plants of an equal size or larger that have worked in the same pits.

Again we wish to tell you how satisfied we are, and if in the future we will require another plant it certainly will be another Diamond.

Yours very truly
Ed Lundin, Contractor
by
Edward N. Lundin
Edward N. Lundin



UPPER LEFT—**Loading some of heaviest pit-run in the state. Note spline-shaft drive, position of power unit. Power unit is easy to get at for inspection and repair.**

BOTTOM—**Dozing pit-run into Diamond shovel-loading hopper. Diamond grizzly and single eccentric plate feeder keep continuous, regulated feed, make record production possible.**

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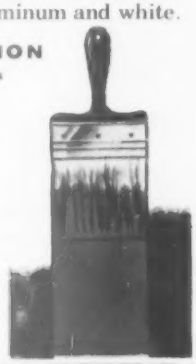

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(2-CYCLE)

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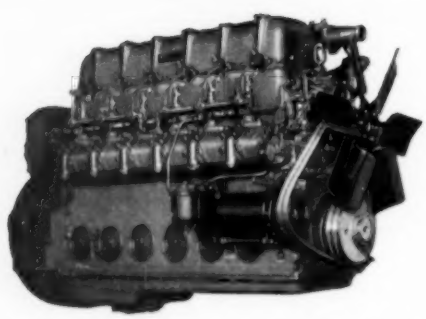
This is the torque curve for the P&H Model 687-C Diesel Engine. Note how the torque characteristics are sustained throughout its entire horsepower range.

That means steady, responsive power at all speeds — greater lugging "ability" for those toughest jobs. It's the kind of unfaltering performance that assures more profits in any service, constant or intermittent.

Steady torque for steady work is just another outstanding feature of P&H Diesel Engines — America's most advanced line. Ask your P&H Diesel representative for the full story. Or write for literature.



P&H Diesel Engines are built in 1, 2, 3, 4 and 6-cylinder models — up to 145 h.p.

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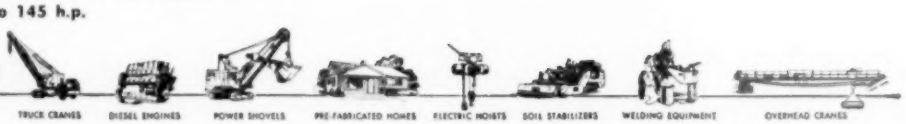
the P&H Line



*Editor's page

Rock products industries prepare for competitive markets

IN COMPARING BUSINESS conditions in 1952 with the past several years and, in projecting ahead into 1953 and beyond, the most striking observation is the extent to which the rock products industries are accelerating preparations to meet competition.

An appraisal of the 1952 record of business for individual producers discloses that those who were among the first to look ahead and take the necessary steps for modernization a few years back were the companies most successful, this past year, in maintaining sufficient volume of sales to hold or increase profit margins.

Stepped up efficiency due to, or in connection with, the economies of increased productive capacity is reflecting in the price structure, to the advantage of the customer, but with increasing pressure on the marginal producer who has not been foresighted or has been financially unable to gear his operations for low unit cost.

Factors in Competition

Many companies in the industry say that competition has already set in to the extent that prices for their products could not be increased even if price controls be removed, and there are cases where prices actually are below ceilings. There no doubt are instances of reducing prices below reasonable levels but, on the whole, this competitive condition is proving that the challenge of high operating costs and taxes is being met.

However, the ability of many producers, notably the portland cement industry, to make needed large-scale replacements and improvements has been hard hit because a large part of such financing must come out of retained net earnings. Their prices may reflect in substantial earnings but the earnings are insufficient to finance capital expenditures for plant installations that now come at three or four times original cost.

As competition grows the tendency will be for those producers of all classes who can, to reach out farther for business in order to maintain the volume needed for profits. The efficient producer is the one who can reach the farthest. Articles in this issue on the subject of production show how advantage is being taken of technological progress to improve efficiency as well as quality of product so that markets might be expanded.

Another strong incentive to modernization and, paradoxically, to enlargement is the restrictive effect of high transportation charges on the geographical size of markets that may be served. In the portland cement industry, as an example, whereas it once was possible for mills up to about five hundred miles apart to compete effectively in each others markets, the distance has shrunk to probably two hundred miles. Yet, even the most efficient large cement corporations must ship up to seventy percent or more of capacity before a profit can be realized.

Competition and Prices

This makes it obvious why some of the smaller cement manufacturers have refused to increase prices even when granted permission by O.P.S. to do so. The aggregates industries in some sections are already finding it inadvisable to raise prices, assuming the government would permit, for fear of losing business to portable plants.

Much of the sand and gravel industry is faced with the problem of product improvement to preserve and enlarge markets. Operations contiguous to metropolitan areas are beset by zoning regulations which make it dsirable to beneficiate marginal materials to the fullest so as to stretch out reserves. With depletion comes higher costs as plants must re-locate at more distant points from their already established markets.

It is in the suburbs of larger cities where there is greatest development and pressure to crowd out local industries. That expansion is oftentimes two or three times the rate in the city itself. Exceptions are in the South where many cities are still growing faster than their suburbs, reflecting industrialization, but the suburbs will later outstrip even those cities in growth with adverse effect on nearby aggregates industries.

Many producers hope that price ceilings will be permitted to expire in 1953 but it seems that reductions in taxes would be far more important. Then, producers might hold the price line while still exercising the option of making long deferred improvements that will later reflect in more favorable prices to consumers.

Reduction in federal government expenditures is, of course, the key to continued prosperity, which would permit tax reductions that in turn would also stimulate private spending to offset declines that could come from reduced defense expenditures. While prospects for these industries are excellent for 1953, conditions might become very rugged a year later if taxes are not reduced.

Bror Nordberg

A Matched Team... by ROGERS

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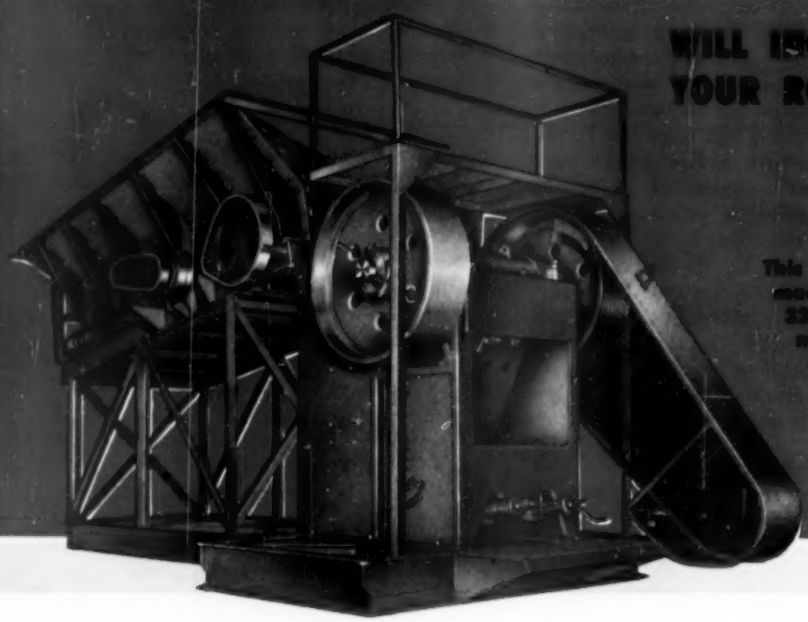

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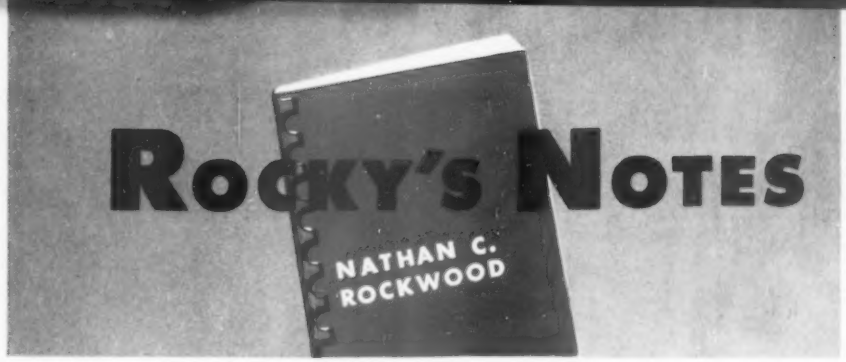

Industry must assume responsibilities

BY THE TIME IN JANUARY that this is published, we probably shall have a clearer picture of the intent and purposes—and possible plans—of the new Federal Government Administration. A great deal will depend on how independent the new President can think and act while surrounded by politicians of far greater experience and undoubtedly greater political acumen than himself. We already know that the majority of these advisors and prompters are highly capable men, but men with chiefly big business experience and sympathies. They are men who also sympathize with development of our foreign relations toward fewer handouts and greater freedom of trade in all its branches, which is a new Republican angle that perhaps is the only important change differentiating them from the so-called "Old Guard" Republicans.

There are at least two members of the new President's Cabinet, however, who may be expected to represent more or less opposition to "freer trade" with debtor foreign countries. One is the new Secretary of Agriculture, who can be presumed not to desire free importation of sugar, and who through an understanding of the economic problems of Western sugar-beet growers, is likely to champion the cause of farm products in general. The other cabinet member is the new Secretary of Labor, who, being a New Deal Democrat, now undoubtedly considers himself in favor of freer foreign trade, but who as a faithful union-labor man will feel called upon to champion the cause of domestic labor, when it shall be hurt, temporarily at least, by imports of goods which it is accustomed to make at home and at much higher wages than foreign competitive labor.

Eastern Influence Predominant

There is little question that the Eastern seaboard influence will be predominant. Much can be expected of it in strengthening the declining value of the dollar, in accomplishing greater economy and efficiency in government expenditures, in cleaning out subversives in high government posts. On the other hand it is quite likely to be economy-minded toward federal expenditures for reclamation and flood prevention, for it may be difficult for them as Eastern business men to see any immediately urgent necessity. The need for better and safer highways may appeal to them, but this is after all a minor item in present federal government expenditures for public works.

What the Easterners' attitude toward labor-management relations may be is difficult to guess at this time. It would appear, from the treatment that Senator Taft has received from the group, that they dislike him and his ideas as much or more than some labor bosses do. If the reader took the trouble to study the abstract of Senator Taft's speech in the "Labor Trends" article in our December issue, he will have a clear idea of Taft's philosophy toward labor legislation in general as well as his attitude toward revision of the Labor Management Relations Act which bears his name.

The new President's appointment of the Secretary of Labor can be viewed from several angles. There is some ground for belief, in the way it was announced, that those responsible specifically desired to affront Senator Taft. It may turn out that Mr. Eisenhower had no part in this, and that being a keen-minded gentleman it may serve to put him on guard against other evidences of spitefulness on the part of men who should be big enough to be above such things. The new Secretary of Labor himself is generally reputed to be, in his home grounds of Chicago and Illinois, a capable and broadminded man; certainly he is as labor union bosses go. His appointment could be largely political—a desire on the part of Mr. Eisenhower's political managers to cultivate labor-union support for future political campaigns, or it may be that being a fair-minded and open-minded gentleman, the new President simply wanted some counterbalance to the preponderant big business elements in his cabinet.

It is evident that any employer, who may be looking forward to a checking of labor influence in the federal government, is going to be disappointed. There will no longer be a Phillip Murray or a Bill Green to lobby in the Halls of Congress and threaten congressmen. But there will be a very experienced Washington labor leader for the A.F. of L., and a red-headed reformer for the C.I.O. Of the two, Walter Reuther of the C.I.O. is undoubtedly the one to watch because he is well educated, much experienced in labor politics and highly capable as an idea man and as a leader. He is relatively young (45 years) and full of ambition for social reforms. He was, and probably at heart still is, a Socialist. He is a founder and important factor in the so-called liberal Americans for Democratic Action.

Among the "reforms" he has actively agitated are: (1) giving unions (which is to say union bosses) a strong voice in decision of industry management, including purchasing, sales and dividend policy; (2) he has advocated government operation of idle plants to make airplanes on a mass production basis; also housing and freight cars. In addition to his red hair, which is usually a sign of an aggressive temperament, with a leaning toward reforms of all kinds, he doesn't drink or smoke, so he should be proof against wheedling. He does have, moreover, a much more brilliant and understanding mind than his predecessor, and so may be open to logical reasoning from whatever source it may come.

Industry's Responsibility

Regardless of the political complexion of industry managers, they are going to be on the spot in the new administration. They are going to have their opportunity to lift the country out of national bankruptcy, to which another four years of the "Fair Deal" and "New Deal" was leading us, but they must also do it so cleverly that every one, so far as possible, will be happy; and "that ain't going to be easy." It means that every last one of us who has a stake in the maintenance of our American System of private initiative and private enterprise, so far as they can be practiced without conflict with the public welfare, must become active in defending and upholding it.

That means organization at both the national and local levels, comparable in activity and aggressiveness with Mr. Reuther, his C.I.O. and his A.F. of L. compatriots. We will hazard a guess that Mr. Reuther comes out on top of the combined group, and becomes the most powerful labor politician of our time. We also venture the opinion that he probably is as well informed in the science of economics as most business men. Therefore it seems imperative that all business men take a more active interest in political economy, which is the kind of economics that is likely to come closest to them in the next few years. One way to do this is by promoting and joining local study groups under the auspices of the Committee for Economic Development, which has issued two very helpful booklets (1) "CED and Economic Education in the Public Schools" and (2) "CED and Economic Research in College-

(Continued on page 101)

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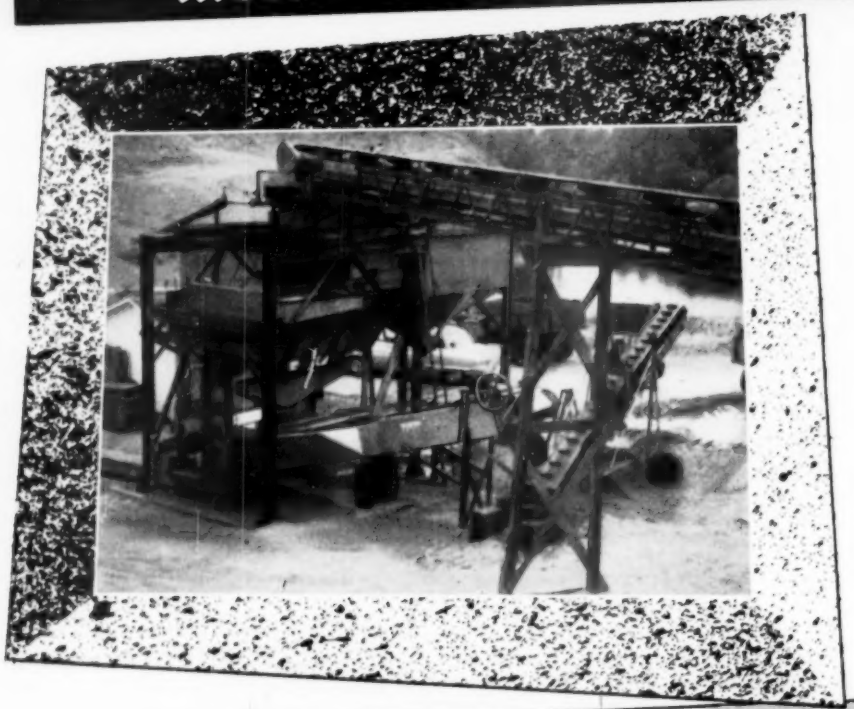

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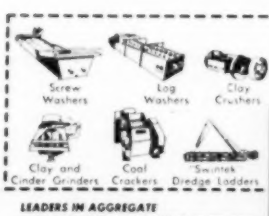

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EAGLE IRON WORKS

LABOR RELATIONS TRENDS

Discarding Established Customs Not in Union Labor Contracts!

By NATHAN C. ROCKWOOD

EVERY LITTLE WHILE an example crops up to illustrate the extreme care that must be used in the exact wording and in the mutual understanding when drawing up union labor contracts. This seems to be especially the case with those provisions pertaining to preservation of certain rights of management, which appears to be a field into which some union bosses are continually trying to crowd, particularly in those parts of the country where there may be strong leftist tendencies in labor unions.

The case described herewith was decided by an arbitrator on October 21, 1952. It involved attempts of a local of the International Hod Carriers, Building and Common Laborers Union of America to collect wages for certain employes for work not performed. The two questions for the arbitrator to answer were whether or not the employer was compelled to retain certain uneconomical labor practices merely because they were long established and not specifically outlawed in a new contract signed on May 18, 1952. The employer was an Eastern crushed stone producer, operating three waterfront plants.

The first instance involved some employes called "boat trimmers" whose job was to shape up the deck loads of crushed stone on scows for transportation to markets. It is related here only as a prelude to the other instance, because the latter case has very general application, while that of the boat trimmers is perhaps more or less unique. Briefly, during the war when labor was scarce, and this special kind of labor probably particularly scarce, the employer made a verbal agreement with the workers at one plant only to pay for an extra hour's work, which was not expected to be performed, in order to get the scow loads trimmed. The custom had thus been established for seven or eight years before the employer decided to discontinue the practice as unnecessary and discriminatory with respect to the trimmers at the other two plants, who had never been given this bonus. What followed is best told in the language of the arbitrator's report as follows:

Each Party's Claims

"The employer contended that the trimmers are not entitled to receive compensation over and beyond the regular hourly rate agreed upon by the parties in their new collective bargaining agreement; that they are entitled only to pay for the hours worked; and further that the additional compensation given to the trimmers in this particular plant, which was not in fact worked, discriminated against other trimmers in the other plants operated by this same employer.

"The union, on the other hand, contended that the company, for reasons important to it, had instituted the practice to pay the trimmers of this plant for an additional hour; that this was now the established custom and practice in the plant and that the employer had no right to change it, especially since there had been no discussion of such a change in the negotiations between the parties."

Arbitrator's Reasoning

"The evidence fails to establish that the elimination of the extra hour's pay had been discussed by the parties prior to the day on which the contract was signed. However, the subject was raised by the employer with the union representative after the signing of the contract. At that time the union representative urged the employer not to discontinue the practice. The union pointed out that the practice had been going on for an extended period of time, and urged the employer to 'let it ride.' However, the employer pointed out that the practice created discrimination with the other plants and promised that, before making its decision, proper consideration would be given to the viewpoint of the union that no change should be made. However, in the first week after the new contract went into effect the payment of the extra hour's compensation for each day of trimming work was discontinued.

"The hearing established that although the employer has two other plants in which trimmers are employed, the practice in issue was limited to the plant under consideration. Moreover, it was also clearly established that this was a voluntary practice on the part of the employer which was never incorporated in the wage scale of those employes, and never made the subject of collective bargaining or of agreement between the employer and the union.

"Payment for services that are not in fact rendered cannot be justified. Moreover, such a practice discriminates against other employes of the same employer performing similar duties in other plants. Under the circumstances and on the basis of all the evidence I find that the employer had the right to discontinue the practice he had unilaterally established. Accordingly the claim of the union that the trimmers are entitled to an extra hour's pay for each day of trimming work is not justified and the grievance should be denied."

A More Common Problem

The other instance is one that could happen to any quarry or gravel pit operator. The question, as quoted by the arbitrator was: "Does management have the right, regardless of past practice, to determine how many employes shall be assigned to a repair job?" Continuing quotation from the arbitrator's report:

"This question concerns the 'pit men' who work the large electric shovel and who are classified as 'special laborers' with the wage rate of $1.70 per hour. This shovel, weighing approximately 80 tons is used principally for the loading of stone, that is blasted from the quarry, into waiting trucks which transport it to the stone crushers. Because of the heavy pressures in scooping and lifting tons of stone, the shovel must be cleaned and repaired with great frequency. These repairs are usually done on Saturday when the plant is not normally in operation.

"The union pointed out that for many years, whenever the large electric shovel required repairs, the employer called the full crew to work, i.e., engineer, fireman, and two pitmen. However, the union contended, the employer was now calling out only one of the two pitmen in violation of an earlier agreement with the union.

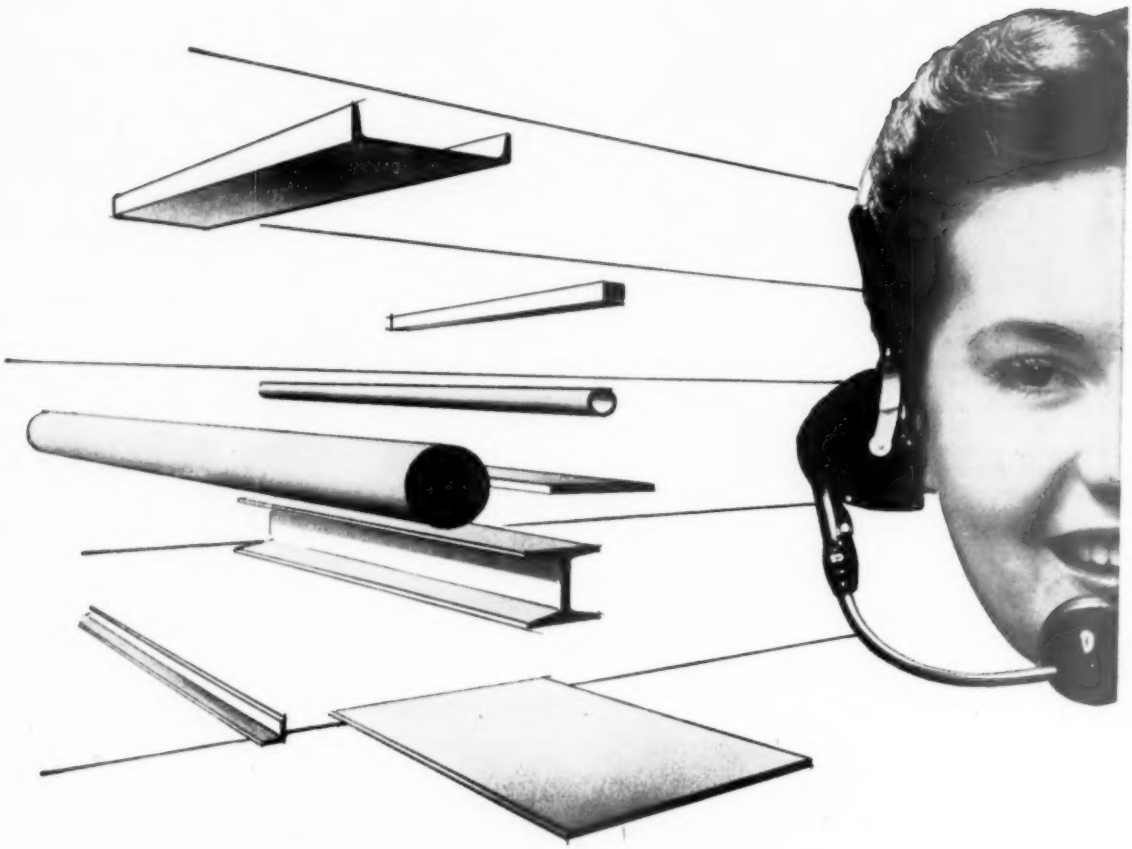
"On the other hand, the employer contended that it has the sole right to determine how many men are needed on a particular job at a particular time and that it had the clear right to call only one pitman at the time of shovel repair if it felt that only one were needed. It relied in large measure upon Article XVI of the collective bargaining agreement which reads that:

" 'The management of the plants and the direction of the working force are vested exclusively with the Company and that the Company retains the sole right to hire, discipline, discharge, lay off, assign, . . . promote and transfer employes and to determine the starting and quitting time and the hours to be worked, subject only to the restrictions and regulations governing the exercise of these rights as are expressly provided in this contract.'

Merits of the Case

"On the basis of the above provision, as well as the inherent rights

(Continued on page 176)



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PEOPLE in the news

Concrete Research

DR. A. ALLAN BATES, vice-president in charge of research and development, Portland Cement Association, Chicago, Ill., recently gave a talk on "Research on Concrete" at a joint

Dr. A. Allan Bates

meeting of the Grand Valley chapter, M.S.P.E., and the Michigan section of the American Society of Civil Engineers. Dr. Bates, who is a scientist and chemical engineer with broad experience in industrial research, joined the P.C.A. in 1946. He holds a Bachelor of Arts degree from Ohio Wesleyan University, a Bachelor of Science degree in metallurgical engineering from Case School of Applied Science, and a Doctor of Science degree from the University of Nancy, France.

Ash Grove Promotions

PURD B. WRIGHT, JR., has been appointed vice-president of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., in addition to his duties as general sales manager. A. K. Frolich, chief engineer, has also been named vice-president, and Robert Sunderland has been made secretary and assistant treasurer. He was formerly assistant secretary and credit manager.

Mr. Wright, who is a graduate of Washington University, St. Louis, Mo., started his career in the cement industry more than 20 years ago.

Mr. Frolich joined the company as a structural engineer in 1924 and supervised construction of the plant in Louisville, Neb., where he was superintendent until 1945 when he was made chief engineer with headquarters in Kansas City. Mr. Frolich is a graduate of Thueringishes Technical College in Ilmenau, Germany.

Mr. Sunderland became associated with the company following his graduation from Washington University, St. Louis, in 1947.

Technical Service Director

EARL R. BRYANT has been appointed technical service director of Universal Atlas Cement Co., New York, N.Y., succeeding Homer G. Farmer, who has retired after 41 years of service with the company. Born in King City, Mo., Mr. Bryant was graduated from high school at Versailles, Mo., and attended University of Missouri. He joined the company at Chicago in 1941 as a technical service engineer following 11 years as cement inspector and materials engineer with the Missouri State Highway Department. In 1946, he was named technical service manager at Kansas City, Mo., in which capacity he served until his appointment last July as assistant technical service director in New York City.

Mr. Farmer, a native of Pittsburgh, graduated in 1911 from the University of Pittsburgh with a B.S. degree in civil engineering. He joined Universal Atlas as a cement sampler at the Universal, Penn., plant, later becoming physical laboratory aide and then mill inspector. In 1914, he was transferred to the technical service bureau at the Pittsburgh office. After serving as field engineer in Pennsylvania, Ohio and West Virginia, he was named eastern manager of the Pittsburgh technical service bureau. In 1928, he was made technical service manager at Chicago and two years later became technical service director, subsequently moving to New York City in the same capacity. Mr. Farmer is a member and has served on committees of the American Society for Testing Materials, American Concrete Institute, American Road Builders Association, Highway Research Board, American Public Works Association, American Railway Engineering Association, Concrete Industry Board of New York and New York Engineers' Club.

Heads Concrete Firm

HARRY F. THOMSON, president of Madison Concrete, Inc., Madison, Ill., has also been made manager of the company's ready-mixed concrete operation. Mr. Thomson, who is a recognized specialist in the concrete field, was formerly in charge of the ready-

Harry F. Thomson

mixed concrete division of the Material Service Corp., Chicago, Ill. Previously he was associated with the General Material Co., which has ready-mixed concrete plants in St. Louis and the Tri-Cities.

Named Board Member

WILLIAM WALLACE MEIN, JR., president and director of Calaveras Cement Co., San Francisco, Calif., has been appointed to the board of directors of the Commonwealth Investment Co. and Commonwealth Stock Fund.

Leaves Concrete Firm

LYNNE HOLT has resigned as superintendent of the Central Mix Concrete Co., Denver, Colo., to return to his former position as reporter and photographer on the Ft. Scott, Kan., *Tribune-Monitor*.

Named Superintendent

ROBERT ALFRED, formerly superintendent of the Dell Rapids, S.D., plant of L. G. Everist, Inc., Sioux Falls, S.D., has been appointed superintendent of the Concrete Materials Co. plant near Sioux Falls, S.D.

Re-elected Board Member

J. A. FREEMAN, JR., general manager of the Pumice Corp. of America, Grants, N.M., was re-elected a member of the board of directors of the New Mexico Mining Association at the recent meeting held in Albuquerque in conjunction with the Southwest Mineral Conference. W. P. Morris of Carlsbad, manager of the Duval Sulphur and Potash Co., was elected president of the association.

To Receive ACI Awards

FRANKLIN R. MCMILLAN, Charles S. Whitney, Boyd G. Anderson, Mario G. Salvadori, Charles H. Scholer, Gerald M. Smith, and F. Thomas Collins will receive A.C.I. Awards from A. T. Goldbeck, president of the American Concrete Institute, at the 49th annual convention in Boston, Mass., February 18, 1953, according to an announcement by the A.C.I. board of direction.

Mr. McMillan, who will receive the Alfred E. Lindau Award, is a consulting engineer in Asheville, N.C. He was formerly manager of the structural and technical bureau and director of research of the Portland Cement Association, Chicago, Ill. Past president of A.C.I., Mr. McMillan received the Wason Medal for his 1928 paper on "Concrete Primer."

Messrs. Whitney, Anderson and Salvadori will receive the Wason Medal for "the most meritorious paper" of the year, entitled "Comprehensive Numerical Method for the Analysis of Earthquake Resistant Structures," which appeared in the September, 1951, A.C.I. *Journal*.

Mr. Whitney, an A.C.I. director and well known for his contributions to reinforced concrete design, was awarded the Wason Medal for his 1932 paper "Plain and Reinforced Concrete Arches," the Alfred E. Lindau Award in 1951, the Fuertes Graduate Medal of Cornell University twice, and the J. James R. Croes Medal by A.S.C.E.

Mr. Anderson is chief designing engineer with Ammann and Whitney, consulting engineers. Previously he was an engineer with Charles S. Whitney, consulting engineer, and field engineer on buildings, canal locks and piers in the designing engineer section of the Bureau of Yards and Docks, U.S. Navy. He graduated in civil engineering from the University of Wisconsin in 1936.

Mr. Salvadori is professor of civil engineering at Columbia University. He received doctorates in civil engineering and mathematics from the University of Rome where he was an instructor and assistant professor from 1930 to 1938. He is the author of papers on theory of structures, reinforced concrete, elasticity and photoelasticity.

Charles H. Scholer, professor of applied mechanics, Kansas State College, Manhattan, Kan., and an A.C.I. member since 1924, and Gerald M. Smith, assistant professor of applied mechanics at Kansas State College, will receive the Wason Medal for "noteworthy research" on their paper "Use of Chicago Fly Ash in Reducing Cement-Aggregate Reaction," which was published in the February, 1952, A.C.I. *Journal*.

General Sales Manager

GEORGE W. MOYERS has been appointed general sales manager of the phosphate division of International Minerals and Chemical Corp., Chicago, Ill. He succeeds Franklin Farley, who has resigned.

Geo. W. Moyers

Appointed Vice-President

JOHN W. BROWN, formerly general sales manager, has been appointed vice-president in charge of dealer sales of National Gypsum Co., Buffalo, N.Y. Wade W. Hildinger has been named general sales manager of dealer sales. Mr. Brown has been with the company since 1935. Mr. Hildinger joined the company in 1942.

On C. of C. Committee

G. F. COOPE, president of the Potash Company of America, Carlsbad, N.M., has been appointed a member of the tax committee of the United States Chamber of Commerce.

Advertising-Sales Manager

DUANE D. BRYAN has been appointed sales and advertising manager of San Xavier Materials, Inc., Tucson, Ariz. He was formerly advertising manager of Besser Manufacturing Co., Adrian, Mich.

Joins Potash Firm

JOHN C. HAVARD, formerly chief engineer of mines for United States Gypsum Co., Chicago, Ill., has been appointed assistant resident manager of the Potash Company of America, Carlsbad, N.M.

Technical Service Manager

ROBERT H. CLORE, technical service engineer, Universal Atlas Cement Co., New York, N.Y., has been named to succeed O. H. Gosswein as technical service manager in Chicago. Mr. Gosswein has retired after more than 35 years of service with the company. Born in Lafayette, Ind., Mr. Gosswein graduated from Purdue University with a degree in civil engineering. He joined Universal Atlas in 1917 as a field engineer. In 1930, he became technical service manager. Mr. Gosswein is a member of the American Concrete Institute and the Western Society of Engineers. He is author of many technical papers on cement and concrete.

Mr. Clore is a native of Hartford City, Ind. He holds a B.S. degree in civil engineering from Purdue University. He joined the company in 1937 as correspondent in the Chicago technical service bureau, and was assigned to field work as a technical service engineer in 1939, which position he has held until his present appointment.

Association President

J. P. EYRE PRICE, president of the Wyoming Sand and Stone Co. and Foam-Crete, Inc., Scranton, Penn., has been re-elected president of the Bituminous Concrete Association of Pennsylvania for his fifth term. Mr. Price is also president of the Pennsylvania Sand and Gravel Producers Association. Frank Webb, president of the Amiesite Co. of Wilmington, Del., was re-elected vice-president, and Harlon Conly, president of the Asphalt Paving and Supply Co., Norristown, Penn., has been re-elected secretary-treasurer.

J. P. Eyre Price

On Safety Staff

ROBERT C. BILLINGS, formerly assistant face boss, has been appointed assistant safety engineer for the Potash Company of America, Carlsbad, N.M. Jack Hesler is head of the safety department.

Elected Vice-President

GLADYS FORD TALBOTT has been elected vice-president of the Miami Gravel Co., Chillicothe, Ohio, and Charles W. Stockman has been named secretary-treasurer. They succeed W. C. Haberer, who has resigned.

Discuss European Potash

R. R. KNILL, A. J. Weinig and W. E. Douglass of the American Potash Company of America, Carlsbad, N.M., recently discussed the European potash industry at a meeting of the Carlsbad section of the American Institute of Mining and Metallurgical Engineers. Mr. Knill, who is mine superintendent of the potash company, discussed European potash mining. Mr. Weinig, refinery superintendent, talked about refining, and Mr. Douglass, director of research, narrated a film on European potash operations.

Named President

ROLAND M. CRAIGMYLE, chairman of the board of Giant Portland Cement Co. and Carolina Giant Cement Co., Philadelphia, Penn., has been elected president of both companies. He succeeds the late John A. Philbrick who died in an airplane accident the early part of August.

Association Officers

RONALD E. DANIELS, vice-president of Federal Portland Cement Co., Buffalo, N.Y., has been elected president of the National Mineral Wool Association, New York, N.Y., and David G. Stenberg, general commodity manager of National Gypsum Co., Buffalo, has been elected vice-president.

Elected President

R. L. HOCKLEY has been elected president of Davison Chemical Corp., Lakeland, Fla. He succeeds his father, Chester F. Hockley, who continues as chairman of the board. Mr. Hockley, who joined the company in 1934 as an engineer, was educated at the Gilman Country School, Baltimore Polytechnic Institute, Phillips Andover Academy and Cornell University. He was made vice-president for marketing in 1942 and executive vice-president in 1951.

Short Course Speakers

T. H. MONAGHAN, sales manager, and Walden Wren, products engineer, Universal Concrete Pipe Co., Columbus, Ohio, were speakers at the second annual Short Course School of Instruction of the American Concrete Pipe Association which was held recently in Chicago, Ill. Howard F. Peckworth, managing director of the association and Dr. Franklin Bills, Northwestern University consultant on selling, speech and human relations, also spoke at the meeting.

Development Engineer

LLOYD B. ROTH, formerly division maintenance engineer with the Ohio State Highway Department, has been appointed development engineer of The Marietta Concrete Corp., Marietta, Ohio. A native of Woodsfield, Ohio, Mr. Roth was graduated from Ohio University, Athens, Ohio, in 1938, with a B.S. degree in civil engineering. After graduation, he joined the State Highway Department as a draftsman in the Marietta office. In his new position, Mr. Roth will be in charge of preparation of roads and streets, curbing, grading and utilities systems to be incorporated in developments of new housing areas made by Kris-Mar, Inc., and the Marietta Concrete Corp.

OBITUARIES

GEORGE G. TREAT, president, Bessemer Limestone and Cement Co., Youngstown, Ohio, died December 12 after a long illness. He was 73 years old. Mr. Treat joined the company in 1901 as shipping clerk. He became an auditor in 1911 and a director in 1919. One year later he was appointed secretary-treasurer and in 1936 was elected president. Born in Austinburg, Ohio, Mr. Treat attended the Ashatabula County schools and studied under Prof. Jacob Tuckerman at New Lyme Institute.

HOMER P. BROWN, president of the Diamond Springs Lime Co., Diamond Springs, Calif., died November 24 at San Francisco, Calif., where he had been visiting his daughter for the winter. He was 74 years of age. Mr. Brown, former California State Highway Commissioner, was born in Butte County. He was engaged in the sugar industry for 21 years until 1927, when he moved to El Dorado County and built the Diamond Springs Lime Co. plant near Placerville, Calif., for the production of agricultural and building lime. He was a director of the Sacramento Valley Council of the State Chamber of Commerce and also of the Mother Lode Highway Association.

C. M. HENKEL, former owner of the Elmore Cement and Tile Co., Elmore, Minn., died recently at the age of 91.

MISS CHARLOTTE F. MICHAEL, retired treasurer of the Nazareth Cement Co., Allentown, Penn., died November 24 at the age of 71. Miss Michael had retired in 1949 after 40 years of service with the company.

HENRY M. MARTIN, formerly superintendent of Rock Asphalt, Inc., Buffalo, N.Y., died November 21 after a long illness. He had been associated with the company for nearly 50 years before he retired as superintendent of the plant in 1940.

JOHN D. SHEESLEY, SR., president of the Sheesley Supply Corp., ready-mixed concrete firm with offices in Allentown and Johnstown, Penn., passed away December 6 at the age of 64.

JERE W. HIGGS, chief engineer and director for Gifford-Hill & Co., Inc., Dallas, Texas, passed away at his home on November 30. He was 59 years old. Born and reared in Arkansas, Mr. Higgs was graduated from the University of Arkansas with the degree of civil engineer. He served in the engineering department of the Texas and Pacific Railway Co. until 1929, when he became associated with the Gifford-Hill companies. Mr. Higgs was widely known in the Southwest for his design and construction of plants for crushed stone, railroad ballast, sand and gravel, ready-mixed concrete, concrete pipe, asphaltic concrete and other aggregates. Mr. Higgs has been succeeded by John R. Hill, Jr., who has been with the companies since the end of World War II.

L. H. FITZPATRICK, advertising manager, National Gypsum Co., Buffalo, N.Y., died recently at the age of 54. Mr. Fitzpatrick was a member of the original staff of the company when it was founded in 1929. He transferred from the sales correspondence and promotion department to the advertising department where he subsequently became advertising manager.

RICHARD H. BUTCHER, president of the Consumers' Sand and Gravel Co., Kalamazoo, Mich., died November 14. He was 52 years old. Born in Parkersburg, W. Va., Mr. Butcher moved to Kalamazoo in 1924. He founded the sand and gravel firm in 1934 and served as general manager before becoming president.

WARD TUTTLE, industrial relations manager, Southwest Potash Corp., Carlsbad, N.M., died suddenly on November 30 at his home in Carlsbad. He was 44 years old. Born in Orangeville, Utah, Mr. Tuttle was graduated from the University of Utah. He joined Southwest Potash Corp. as industrial relations manager in May, 1951, after serving as assistant industrial relations manager of United States Smelting, Refining and Mining Co., Salt Lake City, from 1946 to 1951. Prior to that, Mr. Tuttle was area director of the War Manpower Commission office in Salt Lake City.

CORNELIUS F. GOLDCAMP, manager of the Goldcamp Sand and Gravel Co., Ironton, Ohio, was killed in an automobile accident on December 12, while en route home from a business trip to Columbus, Ohio. He was 34 years of age. Mr. Goldcamp recently organized the Ohio Concrete Co., Waverly, Ohio.

JOSEPH GRANT MORGAN, retired superintendent of the Cement City, Mo., plant of the Missouri Portland Cement Co., St. Louis, Mo., died December 23 at his home near Independence, Mo. He was 77 years old and had retired in 1929.

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. . . That's why:
MORE THAN *500 MILLION* POUNDS OF TEXACO MARFAK HAVE BEEN SOLD!

Because it's tougher and does a far better job than ordinary grease, *Texaco Marfak* is easily the world's most famous chassis lubricant. It *stays in* the bearings. Rough service won't pound *Texaco Marfak* out. Heavy loads won't squeeze it out. Thus, you get longer lasting protection against wear, dirt and rust . . . longer life for chassis parts and lower maintenance costs.

In wheel bearings, *Texaco Marfak Heavy Duty* gives similar top protection. It seals out dirt and moisture, seals itself *in* — assuring longer lasting lubrication and greater safety. It needs no seasonal change.

In engines — heavy duty gasoline or Diesel — use *Texaco Ursa Oil X★★*. It's fully detergent and dispersive, keeps engines clean for lower fuel consumption and maintenance costs. In crawler mechanisms, use *Texaco Track Roll Lubricant* for ideal protection against dirt, water and wear.

Call in a Texaco Lubrication Engineer. Let him help you keep your equipment up and your costs down. Just contact the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO SIMPLIFIED LUBRICATION PLAN helped build Hungry Horse Dam. "The time and confusion saved were incalculable," says contractor. Find out how you can handle all your major lubrication with *not more than six* Texaco Lubricants. Your Texaco Lubrication Engineer will give you all the facts.

TEXACO

TEXACO Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE, on television Tuesday nights. METROPOLITAN OPERA radio broadcasts Saturday afternoons.

industry news

Ned H. Dearborn, president, National Safety Council (right), presents the Council's top award in the field of industrial safety to John W. Mather, chairman of P.C.A.'s Accident Prevention Committee

P.C.A. Wins Top Safety Honors

THE PORTLAND CEMENT ASSOCIATION was recently awarded top safety honors by the National Safety Council in recognition of its outstanding service to industrial safety. The cement industry was cited by the Council as being the safest of all heavy industries in 1951, with current figures indicating an even better record for 1952.

Ned H. Dearborn, president, National Safety Council, presented the honor award to P.C.A. at the association's annual convention in Chicago, Ill., November 12, 1952.

The rate of occupational injuries in the plants of member companies has been reduced 87 percent in the past 28 years. It was estimated that during this period more than 2000 lives had been saved; 2700 permanently disabling injuries averted; and over 100,000 other lost-time injuries prevented as a result of association-sponsored safety programs.

Asbestos Mine Financing

UNITED ASBESTOS CORP., LTD., Toronto, Canada, has signed a conditional agreement with Lake Asbestos of Quebec, Ltd., subsidiary of American Smelting & Refining Co., Ltd., for completion of the development of United Asbestos properties at Black Lake. These will have a production capacity of 4000 tons of ore daily. Lake Asbestos has retained the right to examine the property and to equip the mine for production. If the company decides to follow through with the agreement, it will advance, without interest, the additional funds required to develop the mine.

The money advanced, plus the $1,800,000 spent to date by United Asbestos, will be repayable to the respective companies out of 75 percent of the net profits. The remaining 25 percent will be divided between the two companies according to a formula based on net profit per ton of ore mined. United Asbestos's share is not to be less than 50 percent and may range up to 60 percent, according to the agreement.

Perlite Plant Expansion

WESTERN MINERAL PRODUCTS CO., Minneapolis, Minn., vermiculite processor, has started an expansion program that will include the production of perlite aggregate. The firm recently purchased the perlite processing equipment of the Johnston Manufacturing Co., Minneapolis.

The newy acquired facilities will be operated at their present location until completely new equipment can be installed in Western Mineral's plant. For the present, production will be limited to four perlite aggregates, for plaster, plaster finish, plaster float finish, and concrete. Other products will be added later and perlite processing equipment will also be installed at the firm's other three plants.

Western Phosphate

DEVELOPMENT of the extensive phosphate rock deposits in Idaho and Montana reportedly will be needed to supply the nation with its minimum requirements in the future. It has been estimated that 1960 production of phosphate for fertilizer will have to be 50 percent above the 1950 output to meet the food requirements for our increased population.

Idaho deposits have been estimated to contain about 85 percent of this nation's phosphate rock reserves.

To Install Kiln

THE BOARD OF DIRECTORS of Lone Star Cement Corp., New York, N.Y., following a recent meeting at Dallas, Texas, announced plans to install a third kiln at its Sweetwater, Texas, plant, which will increase plant capacity by approximately 700,000 bbl. per year. The plant, which began operation about a year ago, is presently producing 1,500,000 bbl. of cement annually. The proposed expansion will increase capacity at the company's three Texas plants to over 6,000,000 bbl. The other plants are located at West Dallas and Houston.

Asbestos

DOMINION ASBESTOS CO. LTD., Montreal, Quebec, Can., announced that the European dollar problem, which had acted as a brake in the purchase of Canadian asbestos, was being overcome as dollars were being "blocked off" for the specific purpose of buying asbestos in Canada. The company expects to be in production near the end of the first quarter of 1953. Initial capacity of its mill, now under construction, would be around 2200 tons of ore daily with a production of 200 tons of asbestos per day.

Percentage Depletion

THE COMMISSIONER OF INTERNAL REVENUE, in view of the Congressional extension of percentage depletion to sand, gravel, industrial sand, crushed stone, limestone and certain other minerals, has issued some proposed amendments to Regulations 111 and 130. These proposed amendments, which were published in the Federal Register of October 29, 1952, are not final, but may be subjected to revision before final action is taken by the Treasury Department. Interested persons were granted 30 days in which to file objections and suggestions.

The proposed regulations do not cover mine development or exploration expenditures or mine-to-mill transportation costs. It is expected, however, that proposed regulations on these subjects will be published at a later date.

Cover Picture

DOLESE BROS. Co's new plant at Richards Spur, about 90 miles southwest of Oklahoma City, Okla., is truly the "nation's outstanding new crushed stone plant." Specifications in the area are rigid with many variations in size requirements, and there continues to be a growing demand for more of the smaller sizes of crushed stone. The plant is so flexibly designed that the 750 t.p.h. capacity may be quickly and easily processed into blends to meet the many specifications. An accurately controlled system for blending is the key to balanced production. The plant is fully described in this issue.

Sand and Gravel Plant Opened

BARGAIN SUPPLIES, Sandpoint, Idaho, recently began operations at its new sand and gravel plant at Lignite, Idaho. Capacity of the plant is approximately 175 cu. yd. of washed sand and gravel per day. The crushed gravel is screened into four sizes, ranging from ¼-1½ in. Dan Deshon and Virgil Goodwin, owners of the company, also operate a ready-mixed concrete plant at Sandpoint.

Material Handling

THE FOURTH BIENNIAL Materials Handling Conference, sponsored by Westinghouse Electric Corp., was held at Buffalo, N.Y., October 28-29, 1952. A series of papers presented at this meeting has been reprinted by Westinghouse for distribution. Among these are: "Factors Affecting the Selection of Conductors and Code Interpretation for Cranes and Hoists," by Lewis Price, development engineer, Shepard Niles Crane & Hoist Corp.; "The Application of Adjustable Voltage to Bulk Materials Handling Equipment," by H. G. Dillon, vice-president, Heyl and Patterson, Inc.; "Bring the Control Into the Office," by E. G. Wise, control engineer, Westinghouse Electric Corp.; "An Improved Control for Wound Rotor Motors," by W. J. Heacock, electrical engineer, Link-Belt Co.; "Decline Belt Conveyor Drives," by R. U. Jackson, manager, Mine Conveyor Sales and Development, Robins Conveyors Division, Hewitt-Robins, Inc.; "The Increasing Requirements for Electrical Controls in Material Handling Equipment," by Stephen W. Jessop, chief estimating and designing engineer, Jervis B. Webb Co.; "Recent Improvements in the Design of Small Electric Hoists," by R. Ober, assistant chief engineer, Robbins & Meyers, Inc.; and "Select a Hoist Suited to the Job," by C. O. Barnes, sales manager, Hoist Division, Harnischfeger Corp.

Cyprus Gypsum Plant

GYPSUM IS A NEW INDUSTRY in Cyprus with a $1,400,000 gypsum and plasterboard plant at Vassiliko, on the south coast.

The plant produces gypsum plaster at the rate of 6000 tons a month and plasterboard at the rate of 250,000 sq. yd. a month.

Increases Stock

ROCHESTER SAND, INC., Milwaukee, Wis., has increased its capital stock from 200 shares, $100 each, to 300 shares, $100 each.

Sand and Gravel Plant

GRIBBLE SAND AND GRAVEL CO., Fort Dodge, Iowa, has opened a gravel plant to produce commercial sizes of sand and gravel and pit-run gravel for construction use.

Architect's drawing of new home office of John S. Lane & Son, Inc., in Meriden, Conn.

Connecticut Firm Occupies New Office

THE NEW OFFICE building that is occupied jointly by John S. Lane & Son, Inc., and The Lane Construction Corp., Meriden, Conn., with its suburban location, is another sign of industrial and office dispersal to near-rural areas as one method of coping with the problems of congestion.

The structure is of brick and concrete block construction, air conditioned throughout, and is heated with circulating hot water. Adequate parking facilities are provided in the rear for office personnel with additional parking in front for business purposes. The grounds are beautifully landscaped, and in front is a paved access road so that visitors can park without obstructing street traffic. The offices are attractively furnished and decorated. Recreation facilities have been provided for the benefit of the employes. In the section at ground level, and in the rear, is a recreation room and cafeteria.

The occupancy this year of the new home of John S. Lane & Son, Inc., came on the 52nd anniversary of the company, for it was in 1890 that John S. Lane started operating a crushed stone plant in North Meriden. In 1892 The Lane Construction Corp. was organized. The latter has become one of the largest construction companies in the United States and during recent years has handled large volumes of heavy structural work as well as highway and airport jobs. John S. Lane & Son, Inc., is well known in the New England states as an aggregate and black-top producer. Its crushed stone plants are in Amherst, Westfield, West Springfield and West Stockbridge, Mass.

Arthur F. Eggleston is president of both companies. The other officers of John S. Lane & Son, Inc., are F. C. Lane, vice-president; W. A. Carey, treasurer; and R. T. Turton, secretary and assistant treasurer.

Cement Plant Expansion

DRAGON CEMENT CO., Thomaston, Maine, is installing considerable new equipment at its Northampton, Penn., plant, including a crusher, a reversible impactor, five air separators, five ball mills, and five 1000-hp. motors. New storage silos and blending tanks will also be added. These additions will cost approximately $2,000,000 and are a part of the company's long-range program of modernization and expansion of its Pennsylvania plant.

Florida Phosphate Sales

FLORIDA'S MOST VALUABLE MINERAL, phosphate, sold for a total of $50,262,562 at the mines in 1951, as reported by the Florida State Chamber of Commerce. Sales in Florida amounted to 8,496,831 long tons, a 5 percent increase over 1950 sales. The national increase was 8 percent. Florida produced 77 percent of the national total in 1951, with Tennessee, Idaho, Montana, Utah and Wyoming accounting for the remaining 23 percent. A little less than 100,000 tons were imported from foreign countries.

Uses of Florida phosphate in 1951 were reported as follows: superphosphates, 68 percent; exported, 19 percent; applied directly to soil as a conditioner, 7 percent; in phosphoric acid, phosphorus and related compounds, 5 percent; and in stock and poultry feeds, 1 percent.

Reopen Old Rock Quarry

ROCK CRUSHING operations are underway at the FitzGerald Quarry west of Beattie, Kan., for the production of crushed stone for road construction, as well as agricultural limestone. The historic quarry was first opened in 1870. The operation is run by Harold Oxendale, George Oxendale and Paul Anderson.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of November and for the first 11 months of 1952 are listed by the Portland Cement Association as follows:

	Sq. yd. awarded During November 1952	During first 11 months 1952
Roads	1,192,869	24,244,299
Streets and alleys	987,605	24,355,884
Airports	390,438	9,190,789
Totals	2,570,912	57,790,972

Big Cement Contract

CALAVERAS CEMENT CO., San Francisco, Calif., has started shipments on its 900,000-bbl. cement contract for construction of Folsom dam. The company, which is already supplying cement for Pine Flat dam, near Fresno, Calif., will continue shipments to Folsom through 1954. Because of the recent expansion of its San Andreas plant, the company is able to fill its commitments to both dam projects and also continue full shipments to dealers and other customers, according to H. C. Maginn, executive vice-president.

Directors of Calaveras Cement Co. have approved a 5-year loan of $500,000, at 3¾ percent, from the Bank of America, to cover added expansion costs.

Personnel Tests

SCIENCE RESEARCH ASSOCIATES, Chicago, Ill., publisher of psychological tests and other educational and business publications, has developed for business and industrial use a special catalog of personnel tests and employe relations material. These materials are designed to help select better employes, improve operating efficiency, increase the effectiveness of supervision, increase employe performance, choose employes for promotion, reduce employe turnover, and help prevent accidents on the job. Copies of the catalog are available to personnel, industrial relations and management executives from Science Research Associates, 57 W. Grand Ave., Chicago 10, Ill.

International Minerals Expansion

INTERNATIONAL MINERALS & CHEMICALS CORP.'S latest expansion is the acquisition of Consolidated Feldspar Corp., which has 14 plants in nine states and the Province of Quebec, and produces, in addition to feldspar, mica, flint, aplite, beryl, spodumene, lepidolite and tantalite, and owns large reserves of nepheline syenite. The company now owns and operates plants in 40 locations, and has five product divisions: Phosphate, Potash, Plant Food, Amino Products and Industrial Minerals, the latter of which was established a year ago upon the acquisition of Eastern Clay Products, Inc., which serves as the base for the division. Eastern Clay has five plants in three states and produces refractory clays, refractory specialties, foundry bonding clays, bentonites and oil well drilling muds.

Since entering the industrial minerals field, International Minerals has been in the process of expanding. The corporation's Research Division recently completed a $1,000,000 general research laboratory at Skokie, Ill. Other research laboratories are operated in Florida, New Mexico and California. Its research staff, under the direction of Dr. Paul D. V. Manning, now numbers about 150.

Large Stone Plant

LINCOLN STONE, INC., Thomasville, Penn., organized by officials of the York Building Products Co., Inc., for the production of crushed stone, has placed a new $500,000 operation into production. The plant is immediately adjacent to the plant of Thomasville Stone and Lime Co. Walter W. Sipe, president of York Building Products, is also president of the new firm.

Cement Plant for Pakistan

PLANS WERE RECENTLY ANNOUNCED for a $5,000,000 cement plant to be built in Punjab, northern Pakistan, by Canadian Overseas Projects Ltd., a new company formed by five Canadian concerns. The plant will be financed out of the $25,000,000 voted by the Parliament as Canada's share of the multi-billion-dollar Colombo Plan for building up countries in south and southeastern Asia.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 24,181,000 bbl. of finished cement in October, 1952, as reported to the Bureau of Mines. This was an increase of 6 percent compared with the output in October, 1951. Mill shipments totaled 27,222,000 bbl., an increase of 4 percent over the October, 1951, figure, while stocks were 9 percent below the total for the same month in 1951. Clinker production during October, 1952, amounted to 23,241,000 bbl., an increase of 4 percent compared with the corresponding month of the previous year. The output of finished cement during October, 1952, came from 155 plants located in 37 states and in Puerto Rico. During the same month of 1951, 22,797,000 bbl. were produced in 153 plants.

Coming Conventions

January 26-29, 1953—
National Concrete Masonry Association, 33rd Annual Meeting and Concrete Industries Exposition, Cleveland Public Auditorium, Cleveland, Ohio.

February 2-3, 1953—
National Concrete Products Association (Canada), 4th Annual Convention, King Edward Hotel, Toronto, Ont., Canada

February 2-6, 1953—
National Crushed Stone Association, 36th Annual Convention, Hotel New Yorker, N.Y., N.Y.

February 9-11, 1953—
American Road Builders' Association, Annual Meeting, Hotel Statler, Boston, Mass.

February 17-19, 1953—
American Concrete Institute, 49th Annual Convention, Hotel Statler, Boston, Mass.

February 23-26, 1953—
National Sand and Gravel Association, 37th Annual Convention, Fairmont Hotel, San Francisco, Calif.

February 23-26, 1953—
National Ready Mixed Concrete Association, 23rd Annual Convention, Fairmont Hotel, San Francisco, Calif.

February 25, 1953—
American Concrete Pressure Pipe Association, 4th Annual Convention, Baker Hotel, Dallas, Texas.

February 26, 1953—
American Concrete Agricultural Pipe Association, 3rd Annual Convention, Baker Hotel, Dallas, Texas.

February 26-28, 1953—
American Concrete Pipe Association, 45th Annual Convention, Baker Hotel, Dallas, Texas.

March 1-3, 1953—
Autoclave Building Products Association, 47th Annual Convention, Jefferson Hotel, Richmond, Va.

March 4-5, 1953—
Iowa Agricultural Limestone Association, 8th Annual Convention, Savery Hotel, Des Moines, Iowa.

March 19-20, 1953—
Indiana Mineral Aggregates Association, Annual Convention, Claypool Hotel, Indianapolis, Ind.

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Cable Reels

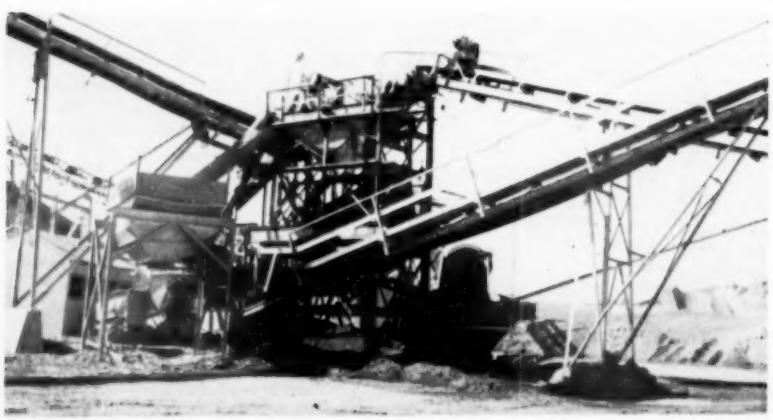
AT ONE ROCK PRODUCTS OPERATION where steel cables are used for many types of jobs (shovels, draglines, slings, guy wires, etc.), the operator

Cable reels mounted on wooden frame

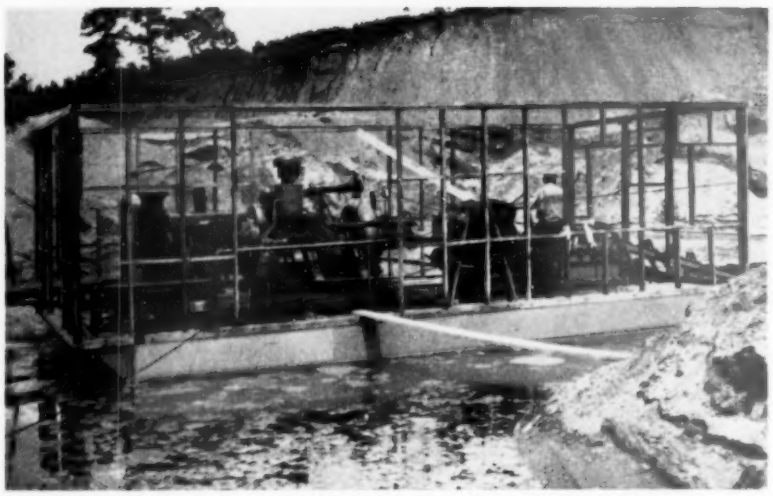
uses eight different sizes and types of steel cable. These are mounted on a wooden frame, thus making the reels easily accessible to the operator and eliminating any possibility of the cable kinking.

Cobble Bin

MOST SAND AND GRAVEL OPERATIONS in California have considerable large-size gravel which is usually crushed and kept separate from the uncrushed. However, one of the newer operations in the Sacramento river drainage area works from a deposit which, although relatively high in gravel content, contains no gravel that will not pass through the 6-in. grizzly over the truck-loading hopper. However, there is enough 2½-in. to 6-in. gravel to justify a wet scalper operation and a cone crusher. A Symons screen and a Symons cone are used. The oversize from the top deck, as in the conventional manner, falls to the crusher. Soon after the operation was underway, a market developed for cobbles, so a small steel truck bin, shown in the illustration, was wedged into a small space, and it is claimed that this installation has paid for itself many times over.



Cobbles are by-passed to truck-loading hopper at left



Main pump, priming pump, stone ladder and winches of this dredge are driven by single diesel engine

Dredging Control

ONE AUTOMATICALLY CONTROLLED engine performs a variety of operations on a new gravel-pumping dredge recently placed in operation by a mid-western sand and gravel company. A single GM diesel engine drives the main pump, priming pump, stone ladder and winches, all through a unique system of power take-offs. This simplified arrangement has not only speeded up the company's production, but has also given a more even flow of material and has reduced hazards to driving machinery, with fewer shutdowns and much simpler operation.

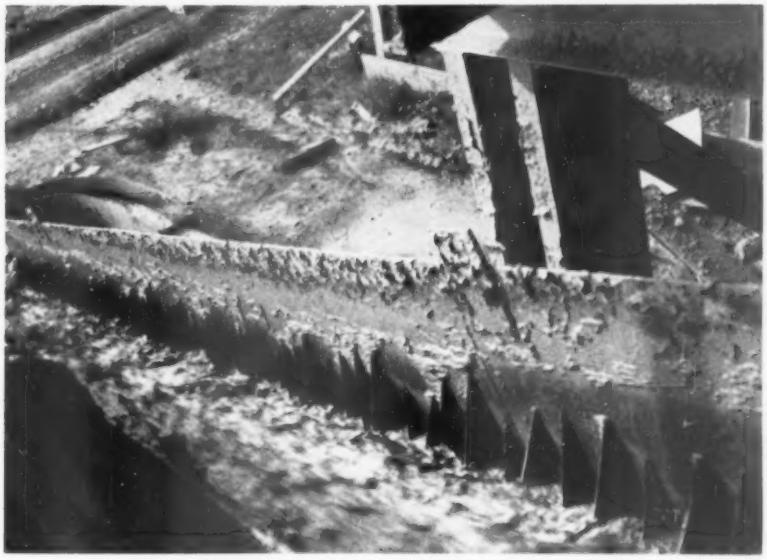
The clutch mechanism of the 8-in. stone ladder can be reversed and, also, "slippage" occurs when a heavy obstruction is encountered or in the event the ladder is buried by a cave-in. In such cases, the ladder is automatically rendered inoperative until the operator, by throwing it into reverse, can pull it away from the obstruction.

The ladder, equipped with heavy cutters, has sufficient power to break through hardpan and clay formations to expose lower layers of usable material. When the pumped material is deposited on the shore to drain, it has of course been subjected to a rewashing through the 8-in. pump and pipeline.

The 16- x 100-ft. dredge, which was designed and built by The Earle Equipment Co., Detroit, Mich., is built of $\frac{5}{16}$-in. plate and has nine watertight bulkheads. The suction pipe is 75 ft. long and dredges to a depth of 50 ft.

Reducing Launder Wear

AT A ROCK PRODUCTS OPERATION in the West, all pit material is first thoroughly scrubbed in a large rotary scrubber. At the outboard end of the scrubber is a cone-shaped screen from which the throughs flow in a steel launder to a 78-in. dia. dewatering unit. The volume of pulp handled is relatively large which, in addition to the minus 1¼-in. gravel and sand,

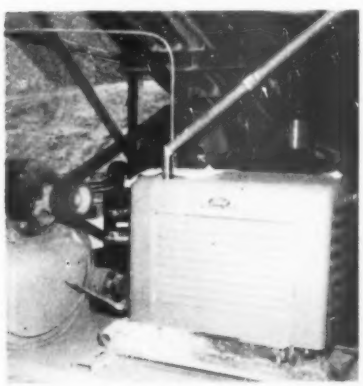


Small angular baffles welded to sides of launder reduce wear

and the steep pitch of the steel launder, result in considerable wear. To help reduce wear at the corners and sides, small angular baffles have been welded to the sides of the launder as shown in the illustration.

Stand-by Engine

THE HEAVY MEDIA SEPARATION PROCESS is currently processing over 60,000,000 tons of material annually and, of this amount, about 6,000,000 tons are in the rock products industries. The essentials of the process involve the separation of coarse rock



In an emergency, air requirements are supplied by a small industrial gas engine

by providing a liquid of high specific gravity in which the heavier material sinks and the lighter floats. One of the essentials of the process is to have a steady and continuous supply of air. Air requirements are not large.

At a rock products operation in the West, stand-by air requirements are provided by having a small Ford industrial engine which is so located that the "V" belts driving the compressor from an electric motor can be quickly switched over to the gas engine.

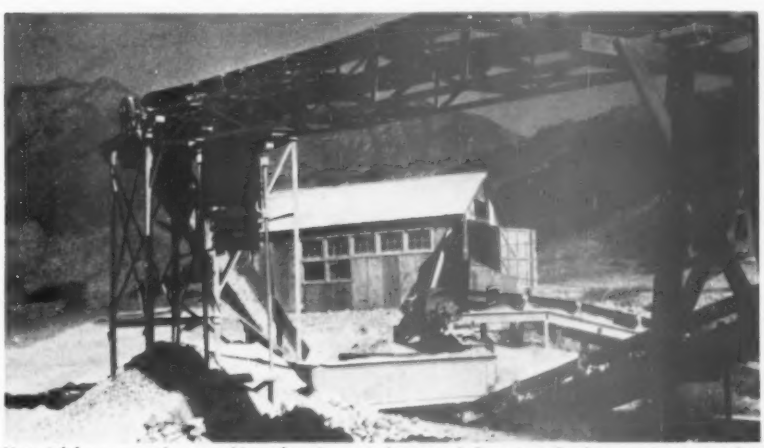
Lightning Conductors

AT A NEW SLAG PROCESSING OPERATION in the desert area of the west, slag from copper furnaces is being processed in a new and modern plant of high capacity. When the operation was less than six months old, it was found that the slag dump had an unusual attraction for lightning. The steel plant and the transformers on the old slag dump added to the attraction. After two losses of transformers from lightning, the operators installed four lightning rods at the corners of the substation, mounted the new transformers on a steel base, and installed a series of ground wires. One set goes to a nearby flowing stream and others finger out in small trenches on top of the slag dump. These trenches were filled with dry calcium chloride with the idea that the salt would absorb moisture from the relatively dry desert air, thereby adding to the conductivity should line surges develop due to lightning. Air breaker switches were also installed so that when the plant was not operating, it could be disconnected from the transformers.

White material in foreground is calcium chloride which covers ground wires; note lightning rods around transformers

Reducing Dust

AT A SAND AND GRAVEL OPERATION in a western section of the country, dust must be kept at a minimum as the operation is close to a residential area. One method that seems to help is to return the products from the secondary crushers to a depressed hopper which also receives the material from the primary units. As the material going to the secondary crushers has been previously washed, enough moisture is retained so that very little dust results at the junction point at the depressed hopper.



Material from secondary crushing plant is carried on top belt to transfer hopper. Pit material is carried on belt in background to same hopper

NEW Machinery

Air Heater

ARTHUR C. BAUMANN, 7011 Grays Ave., Philadelphia 42, Penn., has developed a portable, oil fired heater

Portable oil fired heater

called Eco-Temp Super Air heater. It delivers 375,000 B.t.u. at 2.75 g.p.h., 3680 c.f.m., 240 deg. F. temperature rise, with a 22-in. opening air outlet. The unit weighs 325 lb., is 35 in. high, 64 in. long and 24 in. wide. It is mounted on roller bearing, semi-pneumatic rubber-tired wheels. It has a hook on top for lifting the unit from floor to floor. It can be used effectively for drying plaster, paint, concrete and other surfaces on new or old construction during cold weather. It also can be used for space heating for reduction of cold-weather waiting time in new construction and for drying concrete block. Preheating of engines and equipment normally slow to start is also possible.

High-Pressure Rubber Hose

REPUBLIC RUBBER DIVISION, Lee Rubber & Tire Corp., Youngstown 1, Ohio, is now producing a special type of flexible, high-pressure industrial rubber hose called Wiretex. The hose is claimed to have unusual strength, flexibility, oil and abrasion resistance and ability to withstand high and low temperatures. It is made with a mandrel-cured Reprene tube in lengths

Flexible, high-pressure industrial rubber hose

up to and including 60 ft. The tube is reinforced with a textile carcass which is continuously braided around the tube in multiple rubber-impregnated plies, or with alternating plies of braided fabrics and braided plies of wire, or with multiple braids of standard or extra heavy wire only.

The hose is built to withstand working pressures as high as 5500 p.s.i. and temperatures from minus 40 deg. F. to plus 200 deg. F. Standard sizes range from $\frac{3}{16}$ in. to 2 in. for hydraulic control hose.

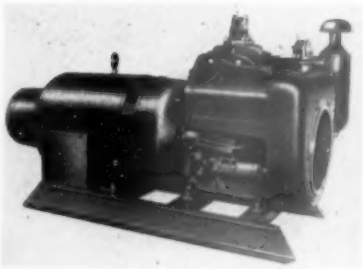
Vibrating Screen

HEWITT-ROBINS INC., 666 Glenbrook Rd., Stamford, Conn., has developed a new style vibrating screen for the sizing and processing of ore, coal, chemicals, rock and other bulk materials. The new screen will handle heavier loads than previous models; it is equipped with a heavier yoke and is mounted on coil springs. The springs are encased in a neoprene rubber accordion-type boot to keep out sand, stones and other substances. All units have 3-in. discharge lips. Both single- and double-deck models will be available. The single-deck model is designed for easy conversion to two decks by the installation of skirtboards, screen cloth, a buckerup frame and discharge lip.

The screen, known as the Robins Vibrex, Model MS, employs the circle-throw principle which gives two positive strokes with every revolution of the counterweights.

Electric Plant

UNIVERSAL MOTOR CO., 494 Universal Drive, Oshkosh, Wis., has announced an electric generating plant, designed primarily for emergency stand-by service. The plant has a 10 kw. capacity. It is available with electric starting or can be supplied with controls which automatically



Stand-by electric plant

start the plant the instant regular power fails. It has a 4-cyclinder air-cooled engine. It can be furnished for single phase or three phase service, at either standard or special voltages.

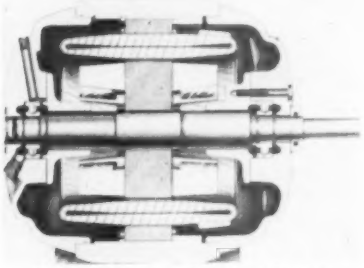
Truck Crane

THE THEW SHOVEL CO., Lorain, Ohio, has added a 6-ton truck crane, designated as Lorain Model TL-10 truck crane, to its equipment line. The crane consists of a complete superstructure equipped as lifting crane which can also be used as a ⅜-cu. yd. dragline or clamshell. The crane is a two drum, gasoline-powered unit equipped with a 25-ft. two-piece butt-flange connected boom. Center sections can be added to extend the boom to 45 ft. The 8-in. pitch diameter hoist drum has a take-up reel for reeling by power and storing up to 100 ft. of excess hoist cable resulting from change of boom lengths, eliminating necessity for floating harness.

Truck crane with 6-ton capacity

Totally-Enclosed Motor

U.S. ELECTRICAL MOTORS INC., Box 2058, Terminal Annex, Los Angeles 54, Calif., has developed a totally-enclosed motor designated as Type SS. It is designed for service where dampness, dust, fire hazards and corrosive fumes are prevalent. The self-cooling motor is provided with a slinger to protect the output shaft bearing against the entrance of dirt or water. To overcome moisture condensation caused by "breathing" which may ground the motor, the company has available an Underwriters'-approved drain plug which will release water



Cross section of totally-enclosed motor

from the interior while still retaining its explosion-proof characteristics.

The motors are available in a range from ⅓ to 2 hp. (also fan-cooled to 75 hp.) and will be produced in larger ratings.

Safety Hat

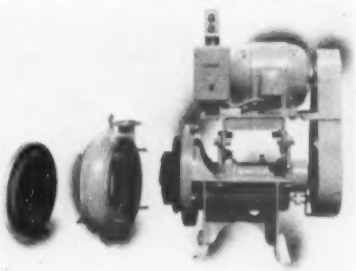
UNITED STATES SAFETY SERVICE CO., 1215 McGee St., Kansas City, Mo., is manufacturing a safety hat made of glass fiber and called the Saf-Hed-Hat. The manufacturer states that

Glass fiber safety hat

the hat meets the A.S.A. Code for dielectric breakdown and exceeds the A.S.A. Code for impact resistance. The cradle of the hat can be adjusted to fit all head sizes and complies with federal specifications.

Solids Handling Pumps

THE GALIGHER CO., 545 W. Eighth South St., Salt Lake City 4, Utah, has begun manufacturing its "Vac-seal" solids and acid handling pumps in rubber-lined and all-metal types in 2, 3, 4, 6 and 8 in. sizes with capacity ranges up to 3000 g.p.m. These



View of 2-in. rubber-lined pump with suction cover and casing removed

pumps operate on the patented "vacuum-seal" principle which prevents fluids or entrained solids from being forced into the gland. The impeller is a disc with pumping vanes on one side and smaller auxiliary vanes having a greater diameter on the reverse side next to the gland. These auxiliary vanes produce a vacuum on the shaft seal and prevent solids from cutting the shaft or packing.

Suction lifts of from 10 to 12 ft. are possible. The pumps handle all types of abrasives and corrosive pulps, slimes, slurries, sludges, tailings, concentrates, coal solids, filtered residues and ash.

The rubber-lined pumps have the lining vulcanized to the cast iron parts with a thermosetting cement. They are suitable for heads up to 100 ft. The pump can be made acid-proof by changing the gland bushing and installing a shaft sleeve.

All-metal pumps are constructed of Ferloy iron for handling larger particles and higher heads than the rubber-lined type. Heads up to 150 ft. are possible with this unit.

Flame Failure Safeguard

COMBUSTION CONTROL CORP., 720 Beacon St., Boston 15, Mass., has announced its Firetron scanner type 48PT1 which provides flame failure protection for gas, oil, pulverized coal or combination fuel burner installations. The equipment guarantees instantaneous burner shutdown in the event of flame failure. It is used in conjunction with control type 26SJ5 for the protection of manually ignited burners and with programming control type 26RJ8 for the protection of automatically fired installations. The Firetron, the eye of the scanner, is a photoconductive cell highly responsive to infrared. With its associated electronic circuits it distinguishes between the infrared of a flame and that of other sources of infrared. The cell is plugged into the scanner unit which consists of a mounting for the cell and a length of cable for electrical connections. The single scanner views both the pilot and main flames and replaces both flame rod and photocell flame detectors.

Industrial Batteries

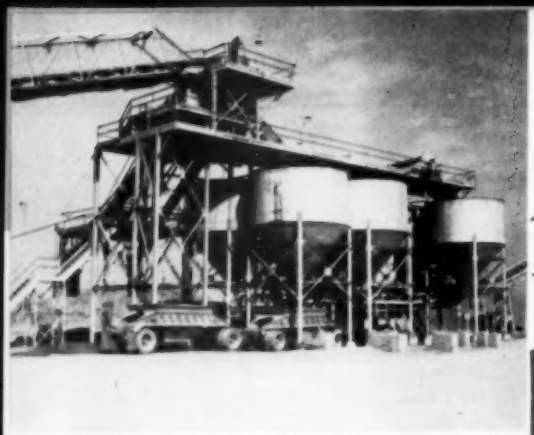
THE ELECTRIC STORAGE BATTERY CO., Box 8109, Philadelphia 1, Penn., has announced a new line of two-cell and three-cell industrial batteries in transparent plastic containers for stationary small power applications. Known as the Exide-Tytex, Type COE, the battery design eliminates the need for wood trays and their cleaning problems and allows flexibility of installation, using standardized inter-unit connectors. The permanent bond between clear polystyrene containers and covers insures that no electrolyte will leak from the battery during its service life. The batteries are equipped with colored pilot balls which indicate the state of charge.

Two-cell, end-to-end battery assembly in plastic container

Solution level lines marked on the containers show recommended upper and lower levels of electrolyte. Funnel filling vents are molded in the covers while unbreakable, spray-proof vent plugs keep out dust or other foreign matter. Both positive and negative grids employ an interlocking rib and bar design which strengthens the plate structure and exposes a greater area of active material to the electrolyte, at the same time tightly locking the specially compounded active material in place. Microporous rubber separators are supplemented by two other insulators—slotted polystyrene sheets and Vitrex retainers to hold the active material in place in the positive plates.

The two-cell units are made in both end-to-end and side-to-side assemblies, while the three-cell batteries are available only in side-to-side assemblies. Width and height of the end-to-end units have been standardized at 8 and 8½ in., respectively, while corresponding dimensions of side-to-side assemblies have been standardized at 4¼ and 8½ in. Capacities at the 8-hr. rate range from 10 to 30 amp.-hr.

PROGRESS IN THE SAND



Kerlinger plant of Pacific Coast Aggregates, Inc., showing truck loading bins

DURING THE PAST YEAR, the writer has crossed the United States from the Atlantic to the Pacific, and from the northern to the southern borders, visiting operations in 40 states of the Union. At Falcon Dam on the lower Rio Grande river, a trip was made across the border to Mexico.

In the areas visited, depletion in the rock products industries was possibly one of the most serious and generally discussed problems. This problem, in part, has grown out of the large volume of material handled as in practically all sections business has been excellent, and 1952 may be an all-time high for tonnage, as well as dollar volume.

A second factor in the depletion picture is the more widespread practice of regional planning commissions to block the opening up of new pits in areas that for decades have been producing gravel. In some cases, a liberal point of view is held by the members of these bodies but more often they have a narrow point of view. The sand and gravel industry is basic to the national economy, and any impairment of productive sources means only correspondingly greater expenditures for sand and gravel by the construction industry.

Toll roads and other superhighway projects are a growing outlet for aggregates with construction delays being due mostly to inadequate financing or awaiting approval of financing plans. Some segments of the aggregate industry experienced delays in expansion programs due to the steel strike. The need for more and better highways is daily becoming more pressing with city traffic creating the more serious problem. Heavy construction also centered about the numerous Atomic Energy Commission projects.

This year our review emphasizes the San Francisco Bay areas and the Central Valley section of California, for here processing techniques in the modern sense are setting a pattern, and because the area will be the focus of the industries' attention at the National Sand and Gravel Association and National Ready Mixed Concrete Association conventions.

About once every five years the National Sand and Gravel and the National Ready Mixed Concrete Associations hold their joint annual meeting in a major city on the Pacific Coast. To many producers in the east, this is a long trek and to pay off, must combine the educational and informative advantages of attending the convention with recreational features tied in with as many plant inspections as time permits.

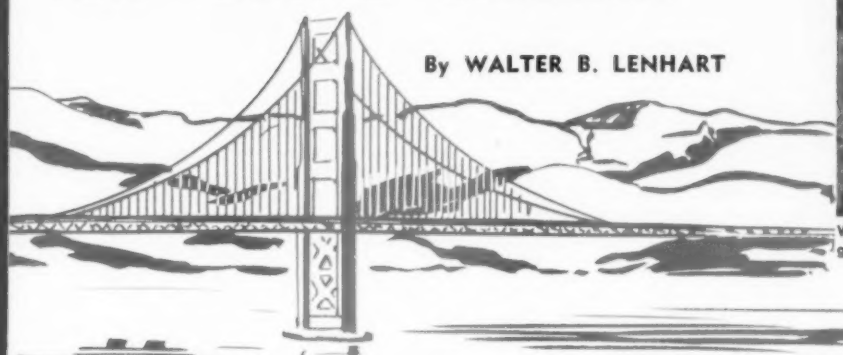
There are so many sand and gravel plants on the Pacific Coast that one could spend several months inspecting them, but this year the editors of ROCK PRODUCTS, knowing that time is an important factor to the "conventioneers," spent the fall months in California with the idea of visiting as many plants as possible and assembling the information into a single article that could act as a guide for the visitor, giving only the highlights of the plants. This would permit selecting those operations that might have a solution for an operator's particular problems. Those plants, especially the larger ones scheduled for inspection as a part of the convention program, are dealt with in more detail.

In the Oakland-San Francisco region, the sand and gravel industry is concentrated in two main areas: the Livermore Valley and Niles-Centerville. Larger production is found in the Livermore Valley, but it is more distant from the metropolitan areas. The Centerville area, while a smaller producing area, is quite important. North of San Francisco, at Healdsburg, is another producing area but very little of that material gets into San Francisco. At Tracy are several plants that serve the Stockton and the rich lower San Joaquin valley areas, with smaller amounts of material being shipped into the Bay areas. At Madison, Sacramento, Fresno and Bakersfield are other important producers. As this is being written a new plant will go into operation at Black Point on San Francisco Bay, only about a 30-min. drive from

New Jersey Turnpike is representative of bituminous pavement which is taking a large volume of aggregates

AND GRAVEL INDUSTRY

By WALTER B. LENHART



Walking dragline excavates material for sand and gravel plant of Basalt Rock Co. at Healdsburg, Calif.

Delegates to the San Francisco conventions will find inspection trips of value in meeting problems. Plant descriptions in this issue will serve as a guide

San Francisco. This may prove to be an important development, not only because of the economics involved in short hauls (possibly waterborne), but the plant will use some techniques that are a "first" in the sand and gravel industry. More will be said about this new operation later.

Enroute to San Francisco the traveler might want to stop off at several cities. At Denver, Colo., the dredge operation of the Cooley Gravel Co. is using liquid cyclones to recover fines. The dredge-type operation is very unique and other producers may find that bringing the plant to the gravel, instead of the gravel to the plant, may help solve their problems. See it by all means, if you go to Denver.

Traveling over the Union Pacific system to "Frisco," convention-bound members will see in Wyoming a large number of aggregate stockpiles along the right-of-way a short distance east of Laramie. This is the largest ballast operation in the world, and is operated by Morrison-Knudsen Co. Don't stop off to see it because it is a granite quarry operation, and not sand and gravel. It was described in the May, 1949, issue of ROCK PRODUCTS, page 67.

In the Salt Lake City area are several operations. Production centers at the north edge of the city where high, ancient beach deposits are processed, but the southern edge of the city also has important producing units. The Utah Sand and Gravel Products Corp., the largest producer, recently installed an all-steel, high-capacity slag processing plant, using slag from one of Utah's large copper smelters.

Reno, the playground of northern Nevada and known as the "Biggest Little City in the World," has several sand and gravel and ready-mixed concrete plants. It is of interest as the mayor of Reno, His Honor F. Smith, is president of the largest sand and gravel operation in the area, Smith, Peterson & Co.

New "Sand Equivalent Test" Influences Processing

Before crossing the borders of California, it might be well to review some of the things that influence thinking and processing methods in the area. Elsewhere in this issue we are giving a review of the aggregates in California by authoritative writers —members of the California Division of Highways. Changes in California specifications may liberalize the rattler tests but tighten down on sand—especially where clay inclusions are a factor.

Recently the California Division of Highways, Materials and Research Department, in a few instances has put into effect the new "Sand Equivalent Test." This, to say the least, created quite a furor in the area, for in essence, if the test is universally adopted it means that practically all sand and gravel, crushed or uncrushed, as well as all crushed fine or coarse aggregates will have to be washed. This applies to materials for bases, subbases, bituminous surfaces, and concrete aggregates. The highway department points out that any clay in sand is detrimental to bituminous work as well as to concrete, and therefore it is desirable to have a quick field test that the engineer or inspector can use to detect *clay-like* materials in the fine aggregates. (The italics are ours.)

They point out that all paving materials have one thing in common: they are all composed of rock fragments that range from micron size to coarse stone, and basically they all come from breaking up and fracturing of rocks and therefore the highway engineers are concerned with the properties and mass relationships of rock particles. They point out that there is not much difference in the capacity of uncemented coarser materials to sustain loads, and that any clean sand, gravel, or crushed stone has been found adequate for constructing bases or subbases for highway work.

Highway engineers have long known that an excessive amount of asphalt will cause instability and that in such cases the asphalt acts as a lubricant and that clay acts similarly

Part of the New York Throughway, now under construction, is an interesting example of concrete paved toll highway

as a lubricant, but the relationship between the clay and the aggregates is more of a volume relationship than a weight relationship. To illustrate: 7 percent asphalt by weight will usually cause instability while over 10 percent of plastic clay might be necessary to get the same effect, but that 7 percent of asphalt by dry weight is about equal to the bulk volume of wet clay corresponding to about 11 percent by weight of the total aggregate. Hence lubrication is not serious until a certain *volume* of lubricant has been used. They feel that the conclusion is inescapable that the fundamental relationship in all designs of aggregate mixtures rests upon the relative *volume* of each ingredient.

Paving asphalts do not vary much in specific gravity but the clay materials do vary widely in weight. They use as illustrations the relative volumes of such dusts as limestone, pumicite, basalt dust, and diatomaceous earths, for 100 grams of each of these dusts when wet will have a widely differing volume; diatomaceous earth will have almost three times the volume of limestone dusts. Some clays expand when wet making the lubricating effect still more effective on a weight basis.

The Sand Equivalent Test was developed to determine the effective volume of clay that exists. In using the test, the undried soil sample is passed through a No. 4 sieve using a loose volume as the standard sample (not weighed). The relationship between the clay and sand on a volume basis then determines if the sand quantity is "high" or "low"; hence the name "Sand Equivalent Test."

The test is performed by shaking a standard and known volume of the sample in a glass cylinder with "water liquid base." After shaking under a standard procedure, the cylinder is permitted to stand exactly 20 min. and the relative volume of the clay and of the sand is then noted. The term "water liquid base" describes the mixture of calcium chloride, glycerine and formaldehyde in the water liquid carrier to aid sedimentation. The glycerine stabilizes the calcium chloride and the formaldehyde keeps bacteria out of the liquid.

In carrying out the test, an 88 ml. measuring can is used or roughly 3 oz. of sample. This is shaken in a glass cylinder that is 1¼ in. dia. x 15 in. high, graduated in increments of one-tenth of an inch. They describe in detail how the measured sample is placed into the liquid and how it is shaken under standard conditions. After the mixture has set for exactly 20 minutes the top of the clay suspension is read on the glass cylinder, then a "weighted foot" is immersed into the liquid in the cylinder. The weighted foot consists of a metal rod 18 in. long having at the lower end a 1-in. conical foot. A weight is attached to the top of the rod to give a total weight of 1000 grams for the assembly. The weighted foot is gently lowered until it comes to rest on top of the sand and the reading taken of the top of the sand. The sand equivalent then becomes equal to the

$$\frac{\text{reading at the top of the sand}}{\text{reading at the top of the clay}} \times 100.$$

For the highest type of bituminous paving mixtures an S.E. value of 60 has been established. A value of 50 S.E. is proposed for the Type "B" plant mix. No value has been set for concrete aggregates but 80 to 85 S.E. appears to be met by most commercial sand operations in the area so the value will probably be in that range. The main purpose of the sand equivalent test is to keep out clay inclusions that may be present "without the knowledge of the engineer in charge." This wording indicates considerable tolerances in the enforcement of the test. However, the highway engineers say "The only remedies for this particular problem [clay-mud, etc., in the mix] are dilution with a clean granular aggregate, production of aggregates by crushing from oversize, or by washing."

Processing Fine Sand for Black Top

Several problems in economics present themselves in the processing of a fine sand or "filler" for black top. Under this procedure, it will no longer be possible to add dry "blow sand," soil strippings and similar fine dry materials for the purpose outlined—they may have to be washed. In washing, the particles have to be scrubbed first. Scrubbing of fine aggregates (sand) has not been practiced very much in the sand and gravel industry; however, in the preparation of some industrial sands attrition machines are being used successfully. One type which is working quite successfully in the glass sand plants in the Monterey area was described in the February, 1952, issue of ROCK PRODUCTS, page 100. They were developed by one of the nation's large glass sand processing companies, and the license to exploit the attrition machine has been turned over to the Western Machinery Co. Other glass sand operators use three or more inclined spiral classifiers operating in series to adequately scrub and wash sand grains. The scrubbing problem is therefore not insurmountable.

But in the case of the sand equivalent procedure, once the particle has been scrubbed and the clay removed from its surface, the next problem is to recover the finer fractions, i.e., those filler particles in the minus 200 to 325 mesh (even micron) range. Here again newer techniques and equipment may have to be adopted, and we are referring specifically to the so-called "liquid cyclones" for the recovery of the extremely fine sand fractions. Some of these liquid cyclones have been described in ROCK PRODUCTS, such as the DorrClone, Whirlcone, Centriclone, and a more recent addition, here mentioned for the first time, the Triclone.*

Briefly, the liquid cyclone in outward appearance is a small version of a conventional dust collector but in this case the liquid pulps are pumped into the unit tangentially and under pressure. The centrifugal action within the unit separates the fine sand from the clay. They are

*For published data on liquid cyclones see January, 1952, pages 126-127, May, 1952, page 152 and the article on Pequannock Sand & Gravel Co. in December, 1952, page 116. We first encountered liquid cyclones (DorrClones) in the phosphate fields some three or more years ago, and something about their use was published March, 1951, page 74. Another type of liquid cyclone (Whirlcone) was found in use at the Caudell and Johnson sand and gravel plant in San Diego which was described in the August, 1950, issue, page 108. In the May, 1952 issue, page 80, reference was made to the use of liquid cyclones in connection with processing phosphate. Incidentally, the same article told of pumping sand five miles.

The DorrClones are manufactured by the Dorr Co., Stamford, Conn. The Whirlcones are made by Cottrell Engineering Co., Los Angeles, Calif., with Georgia Iron Works, Atlanta, Ga., manufacturing for the eastern markets; the Centriclones are made by Equipment Engineers, Inc., San Francisco, Calif., and the Triclone by Western Machinery Co., San Francisco, Calif. The Triclone is still in the experimental stages but has been tried out in the field. It is designed to take out three sizes: a sand, a slime, and a middling. In some cases the middlings have been flake mica.

Centerville plant of Pacific Coast Aggregates, Inc. (A) Main screening tower (wet processing) for gravel. (B) Two sand preparation machines. (C) Scrubber. (D) Two reduction crushers. (E) First

relatively cheap to install, have high capacities and are one answer to the problem of recovering fine plus 325-mesh minus 100-mesh sands normally lost in most washing processes. However, in many cases, if the clay is colloidal and does not tend to settle rapidly along with the fine sand, conventional rake and spiral-type classifiers are quite effective.

Those who go to California by automobile can explore to a greater extent that part of California which is the keystone of the growth and prosperity of California—especially the prosperous area north of Bakersfield where the multi-billion dollar Central Valley Project, sponsored by the Bureau of Reclamation, is being built by that agency and the Corps of Engineers, U.S. Army. This is a giant irrigation and power development program with much of the power being used to pump water. Near Tracy, Calif., is the second largest pumping plant in the world. Tracy is an important aggregate producing center. This huge pumping plant has six giant Worthington centrifugal pumps, 7 ft. in diameter, each powered with a 22,500-hp. Westinghouse motor. They pump through three parallel lines of 15-ft. inside dia. precast concrete pipe—the largest in the world—and elevate the water 197 ft. at the rate of 2,000,000 g.p.m. The water then flows southward by gravity through the concrete-lined Delta-Mendota canal and crosses the southern end of the great Central Valley, a few miles north of Bakersfield.

Shasta dam in northern California near Reading is the second largest concrete dam in the world. Friant dam near Fresno is another large concrete dam. Pine Flat dam is now under construction near Fresno, and Folsom and Nimbus dams are now under construction on the American river above Sacramento. These are all a part of Central Valley Project.

If producers have troubles with roots and similar foreign matter in their material, the Pine Flat dam technique may be the answer. ROCK PRODUCTS published a description of the aggregate processing at Pine Flat in the February, 1952, issue, page 104. Contractors at Folsom dam are processing their own aggregates. The operation features a processing plant on one side of the river with an extensive belt conveyor system and a steel suspension bridge to convey finished material to the batching plant on the opposite bank. Telsmith and Barber-Greene equipment is used in the processing plant and conveyor system.

Centerville—Pacific Coast Aggregates

THE CENTERVILLE PLANT of Pacific Coast Aggregates, Inc., was first described in the May, 1949, issue of ROCK PRODUCTS, page 92. Soon after, a Hardinge mill was installed to help solve the clay problem, and the plant was again described in the April, 1952, issue, page 131. This plant may be one of those visited as a part of the convention program, and because of its general layout it can be easily and quickly inspected.

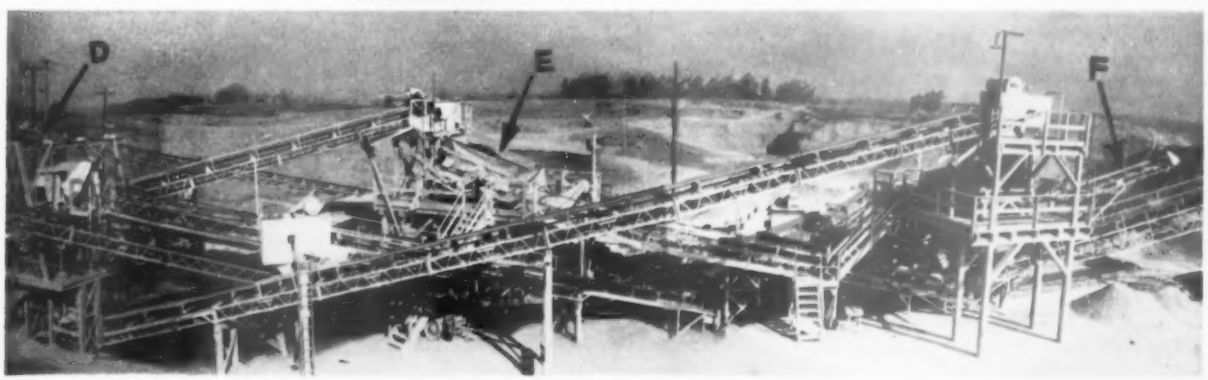
The operation started on a relatively small scale with a combination portable and stationary setup. Additions each year have made it quite an extensive operation as may be seen from the illustration. Operating problems here revolve mostly about clay seams or lenses in the deposit, a typical condition with all the producers in the area. Several schemes are currently in use that range from mining down to the lens and removing it as strippings, to mining the material and then letting it partially dry out, after which the clay washes out of the gravel and sand quite readily. Some hand picking has been necessary. However, normal practice is to run all the minus 6 in. from the pit truck grizzly through the Hardinge scrubber. The scrubber, driven by a 200-hp. motor, handles about 500 t.p.h. To make the scrubber work efficiently, the operators installed 6-in. high angle-iron lifters. They are hard surfaced, and are expected to last eight months. Manganese steel liners are used in the scrubber. The lifters pick up a considerable mass of the relatively small size gravel and drop it. The water-sand-pulp in the unit tends to cushion the impact of the falling gravel, and the operators may try a screen ahead of the scrubber to remove the smaller sizes and increase the impact in the scrubber. The success of the trial will depend somewhat upon the need for scrubbing the sand, and it will help determine if scrubbers of this type actually do much good scrubbing sand.

Crushed gravel is kept separate from the uncrushed. Road stone, or crusher run, is an important product here. All materials are crushed to minus 1½ in. There are three stacker belts to ground storage for the washed gravel and one for sand. On the road stone section are three more stacker belts, one of which is a radial stacker. All material is ground-stored and reclaimed by either Hough Payloaders or Bucyrus-Erie clamshells that load to cylindrical truck loading silos arranged in three groups with two bins to a group. Bins are used only for worked sand and gravel. No railroad serves the plant.

At this operation will be seen about every type of haulage truck operating in the West, ranging from conventional dump trucks to semi-trailers, including large rear-dump and bottom-dump trucks, and bottom-dump trailers. In the pit, draglines load Wooldridge Cobra wagons used for haulage.

A second 48-in. Wemco sand preparation machine has been added to recover more efficiently the one grade of washed sand having a high percentage of fines. The plus 1½-in. minus 2½-in. size gravel is screened out and sent to two No. 322, Type "R" Allis-Chalmers reduction crushers. Most of the screens in the plant are Tyler units. The portable section of the plant is a Diamond Iron Works unit.

screen (scalper). (F) Stackers for crusher run (3), one a radial stacker. Stackers for washed gravel are at extreme left



Belt conveyors with relatively low lifts are used extensively. They are designed to provide great flexibility in moving materials to the wet section, to the crushed gravel section, or to the road stone plant.

A black-top plant operated by others adjoins the property. Like practically all producers in the area, a dry batching and ready-mixed concrete plant also is operated by Pacific Coast Aggregates. It features Blaw-Knox weigh batchers.

J. C. Paulo is superintendent of the plant.

A short distance to the east is the operation of the Inland Aggregates Co. that was described in the July, 1949, issue of ROCK PRODUCTS, page 65.

Kerlinger—Pacific Coast Aggregates

THE KERLINGER PLANT of Pacific Coast Aggregates, Inc., is the second largest unit operated by the company. It is located about five miles south of Tracy, Calif., and serves the rich lower San Joaquin river area including such valley towns as Stockton, Modesto and Merced. Some shipments have gone into the Bay areas. The plant was described in the September, 1947, issue of ROCK PRODUCTS, page 70, soon after its completion. Like the Eliot plant, it is a neat, well-engineered job, and another show place of the company.

Operation of the pit is built around the use of four Wooldridge Terra Cobras or road scrapers. Each hauls a payload of 20 tons of finished material which includes plant losses. When using three Cobras and one D-8 Caterpillar pusher, 22 loads per hour are handled. With four Cobras and two pushers, the number of loads per hour is doubled. Normal capacity is 360 t.p.h. in the wash plant plus 200 t.p.h. for the road stone plant.

At the outset of operations, the plant had two surge piles but a flood destroyed part of this assembly.

Pit-run surge piles were never too successful because the clay content packed in the pile causing funneling although additional gates equipped with vibrators improved conditions. Terra Cobras now can strip out these clay lenses when they are encountered in the pit.

Several important additions to the plant also have been made since its earlier operation. Probably the most important of these is in the sand recovery system which grew out of a desire to recover more sand, especially the finer sizes. In the older sand system, 85 t.p.h. were handled with the following sieve analysis:

Mesh	Percent retained
30	0.7
50	7.3
100	33.5
200	30.5
−200	28.0
	100.0

After a considerable study and trial runs, the company added two 48-in. Wemco sand preparation machines, one in the primary system and one in the secondary system. Overflows are wasted and the sands from the Dorr rake classifiers and the 48-in. sand machine in the secondary system are blended to make one product. Over-flow product sieve analysis follows:

Mesh	Percent retained
30	None
50	None
100	3.02
200	33.64
−200	63.34
	100.0

As a result of these and similar data Pacific Coast Aggregates has installed seven additional 48-in. Wemco sand preparation machines in five of its other sand and gravel plants.

Present methods of handling sand have been developed from experience in supplying the Bureau of Reclamation, Army Engineers and others in the area who wanted a drier sand. A horizontal boom stacker from the main plant was installed and finished sand was stored on the opposite side of the railroad tracks serving the plant. Sand is cast back as many as three times, each movement of the sand paralleling the track so that well drained sand can be loaded to cars; 72 hr. is minimum drainage time. Nearby a small steel hopper has been installed so that this drier sand can be blended with the wetter current production (in bins) and sent to the truck loading silos. Facilities are also available so that washed gravel and/or sand can be blended in with road stone so as to improve its "plasticity index."

Another addition has been the installation of a 5- x 10-ft. peripheral discharge Marcy rod mill that is grinding 40 t.p.h. to minus 0.162-in. square openings. Pea gravel and surplus sizes are fed to the mill. One unusual feature here is the use of a bucket elevator instead of the more conventional pump to deliver the finished grind to the classifier alongside. This was done to cut down dilution and to deliver a thicker pulp to the 48-in. sand machine used as a classifier. There is no loss of minus 40 mesh from this spiral. The manufactured sand is returned by belt conveyor to the wet screening and secondary sand recovery equipment mounted over 14 steel silos. The silos, plus those used for truck loading, are the dominant features of this well-kept, all-steel plant.

In the wet screening section additional screen capacity has been installed to re-screen finer sizes.

For primary crushing, a 10- x 36-in. Farrel-Bacon jaw crusher is augmented by 4-ft. and 3-ft. Symons cone crushers, both equipped with fine bowls. For road stone, a 5-K Gates gyratory, and a 4-ft. standard Symons cone, using fine liners, are used. A 100-cu. yd. per hr. Noble batching plant is available.

Preliminary scrubbing is done with a 6- x 32-ft. rotary scrubber or blade mill that also acts as a preliminary screen. Minus ½-in. material is dewatered in a Dorr duplex rake classifier, and the products sent to the secondary screening plant. The plus fraction (3 in.) falls to the primary jaw crusher. Ty-Rock screens are used.

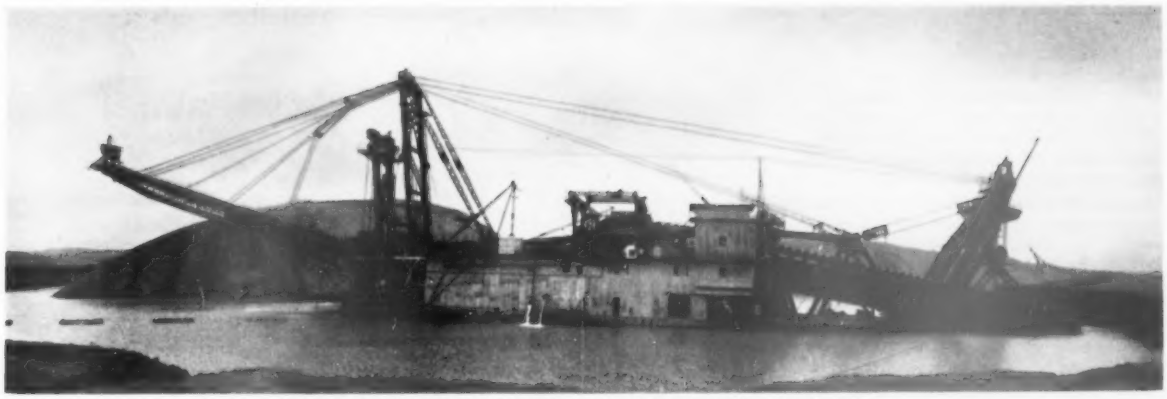
A considerable saving in water has been accomplished by pumping fresh water to the secondary screening and final sand recovery section with the rejected water from this section being returned to the primary scrubbing and screening section. Water for rinse purposes at the loading point is supplied by a 3-in. pump at the tailing pond. The total now used is 1600 g.p.m.

The plant uses belt conveyors exclusively, and they are so arranged that high flexibility is possible in routing material through the plant. All sizes in the steel shipping silos can be recrushed. The plant has built up a nice business of 100 percent crushed gravel, especially in the finer sizes.

Earl E. Williams is plant superintendent.

Black Point Plant

AT BLACK POINT on San Francisco Bay, a new plant went into operation early in December, 1952. There is a large deposit, but due to the nature of the material unusual processing is required. The plant is the first commercial sand and gravel operation in the world to use attrition machines to free the sand grains from surface contaminants. Attrition machines of the type in use at Black Point were developed on the West Coast in the silica sand industry to remove clay, iron oxide and other deleterious surface coatings from glass sand. The rights to manufacture and sell this type of attrition machine were obtained by the Western Machinery Co., and ROCK PRODUCTS, in the February, 1952, issue, page 100, described for the first time their use at the silica operations of the Del Monte Properties Co. at Pacific Grove on the Monterey peninsula. Tentatively, a post-convention trip for San Francisco conventioneers is planned for the Monterey-Carmel-Pacific Grove area for the week-end following the meeting. If this trip is carried out,



Dredge of Yuba Consolidated Gold Fields with digging ladder starting a cut

the visitors will be within walking distance of the plant.

The attrition machine is essentially a vertical spindle with specially designed paddles affixed to it. The rubber-covered spindle has 18 paddle arms bolted to it. The paddles also are wear-resisting material and can be easily and cheaply replaced. Their life is expected to be nominal. The r.p.m. depends on the type of material processed, but is in the 180 r.p.m. range. The cell in which the spindles operate is octagon-shaped. Each spindle is directly connected to its drive motor.

The machine is usually arranged in rows of four or more with each unit operating in series with the next. Wet sand in the form of a thick, grainy pulp is fed into the first machine. Due to the design, the pulp reverses its direction several times in the machine, and also on entering the succeeding unit. The matrix does not revolve as a single mass as the spindle turns, but the grain particles move against each other. The pulp has a solids content in the 80 percent range with just enough water to maintain a stiff, ropy pulp. As the sand moves from unit to unit the surface coatings are removed progressively so that eventually the material coming out of the attrition machines resembles relatively thin oatmeal mush. The horsepower for the first unit is higher than that required for the machine at the discharge end, showing the lubrication effect of the clay liberated. The number of units and horsepower requirements will depend on the type of material and the degree of thoroughness required but they are well within economic limits.

At Black Point, eight attrition machines are arranged in two rows of four each. Preliminary test work shows that the attrition machines are doing an excellent job.

"Gold Dredges" for Aggregates

EXCAVATING EQUIPMENT that this traveler can really get enthusiastic about are the gravel digging units near Folsom and Marysville. The former is east of Sacramento and the other roughly 50 miles north. Though they are gold dredges the experience accumulated over half a century with these low cost operations can be used to advantage by sand and gravel operators.

One of the units digs to 124 ft. below the water line with a bank up to 50 ft. high above the water line, or a total of 174 ft. The gravel dug resembles conventional commercial deposits with some boulders in the 12 to 18 in. range. The dredge buckets unload to a large rotary screen and all plus ½ in. either falls back to the pond, or is stacked by a long belt stacker on the stern of the boat. Up to this point, the dredge is essentially a digging, transportation, and scalping operation and therefore parallels operations in the rock products fields. In spite of recent rising high costs the dredges in the Marysville area, built by the Yuba Manufacturing Co., can show an operating cost that includes all field charges, everything except corporation taxes, in the 4½ to 8¢ per cu. yd. range. Subtract from this total a small amount for charges related to the gold recovery section and one comes up with a figure that can find few parallels in the rock processing fields. These powerful dredges can excavate hard and tightly bound materials with the entire digging energy imparted to the bucket line to deliver a payload.

A recent adaptation of this type of dredge was used at Canyon Ferry dam on the Missouri river in Montana to process gravel and sand and to do other excavation work at the damsite with a substantial saving in time although the dredge was not always used to its best advantage.

Because of the location of these dredges, it would be difficult for anyone not familiar with the field to inspect them, but officials of the Yuba Consolidated Gold Fields have indicated their willingness to let members of the National Sand and Gravel Association see the dredges and will provide guides. A group of 20 or more could make such a trip after the convention is over, using bus transportation. It would take a day for the round trip, or if desired the visitors could be dropped off at Sacramento at the conclusion of the inspection. Dredge and dragline operators should, if possible, take advantage of this generous offer.

There are several important phases of the sand and gravel industry that may make this type of deep-digging, bucket-ladder dredge attractive. One is depletion of deposits, particularly underwater deposits of great depths, where the pit may have to be abandoned because of the lack of a low-cost deep-digging unit. Secondly, cases are on record where a deep, underwater deposit was kept exposed by reducing the water horizons in the pit by pumping. This lowered the water table in the surrounding farm area. Operating practice became jeopardized because the adjoining farmers pumped water for their use and lowering the water tables was a point of friction. However, the main attractiveness of these huge dredging units stems from their high capacity and low operating cost.

In the Marysville area, Yuba Consolidated Gold Fields has six dredges in service. An area roughly three to four miles wide and about 10 miles long has been dug. These dredges were all built by an affiliate company, Yuba Manufacturing Co. The dredge shown in the illustration is No. 17 of Yuba Consolidated Gold Fields. It has a displacement of 3500 tons. Nearby is dredge No. 20 that displaces 4000 tons. No. 17 digs to 112 ft. below water level and No. 20 can dig to 124 ft. Buckets are 18 cu. ft. capacity and they dig from 11,000 to 13,000 cu. yd. per 24 hours with about 12,000 cu. yd. a normal day's output. A single manganese steel bucket on No. 17 with pin and Amsco wearing lip weighs 5000 lb. Spuds weighing 80 tons help hold the dredge in position. The upper tumbler over which

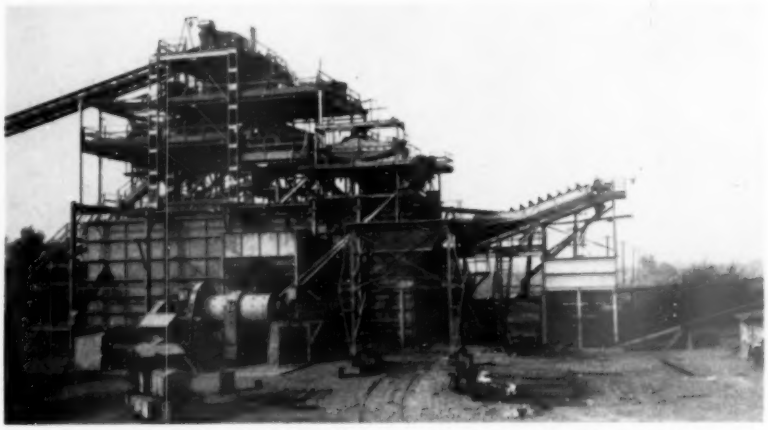
the bucket line drives is a 20-ton casting. The digging ladder and loaded bucket line weigh 1000 tons. No. 17 has an 8-in. monitor mounted on the bow to help cave down high banks. The bucket line drive requires a 500-hp. motor, and the pump for the monitor a 300-hp. motor. The dredges work around the clock, shutting down only on the Fourth of July and Christmas and then only on the day shift. Field headquarters are at Hammonton. A mobile repair system helps service all five dredges. No. 17 requires four men per shift and a dredgemaster.

The rotary screen on No. 17 is 9 x 42 ft. and is made up of five courses of perforated ARS and manganese steel plates using a total of 45 plates. Some of the plates have cast slots but most have ½-in. to ⅝-in. tapered-drilled holes.

Deep digging became possible with the ladder-type dredge with the use of the Perry bucket idler. It is a device mounted on the underside of the digging ladder over which the return bucket line rides, about mid-way in the line. It reduces the catenary of the slack side of the bucket line.

At the time the photo was taken, No. 17 was starting to make a new cut. To do this, the digging is started at the top of the face with the dredge swinging to the right, and to the left around the spud. As digging proceeds the digging line is lowered progressively.

Charles Deaver is superintendent with headquarters at Hammonton.



Final screening and washing plant of California Rock & Gravel Co., Livermore, Calif.

California Rock and Gravel Co. Plant

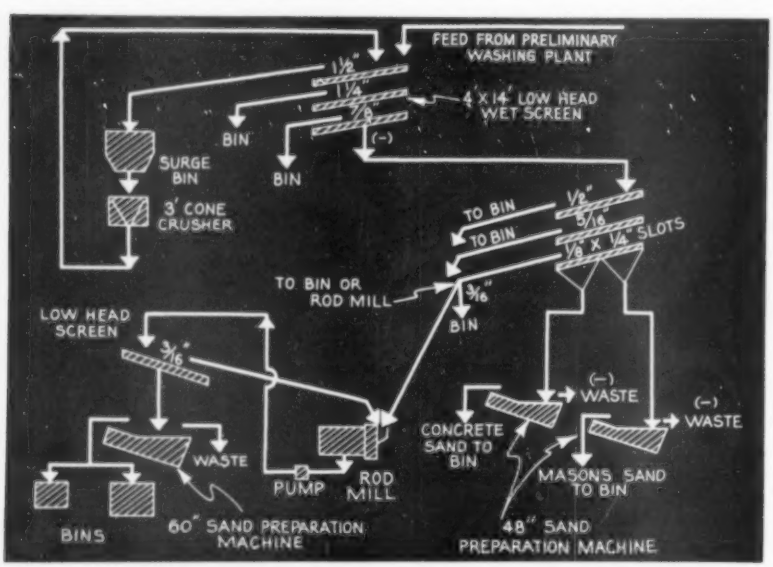
LOCATED ABOUT FIVE MILES east of the two larger sand and gravel operations in the Livermore Valley is the plant of the California Rock & Gravel Co. While of more modest capacity, it is probably one of the most efficient in the area. It is one of the few plants on the West Coast where practically all of the output is shipped by rail. Although it is a relatively old operation, it still keeps up with processing techniques. The plant has a capacity of 225 to 250 t.p.h.

Each year the car shortage situation in the West becomes more and more acute, especially when the sugar beet crops are moving. This company may therefore install more convenient facilities for truck loading.

The company was the first in the valley to manufacture sand from excess pea gravel. For many years a hammermill was used for this purpose, and the operation was briefly described in the February, 1947, issue, page 92. Two years ago, the company installed a 5½- x 12-ft. peripheral discharge Marcy rod mill to replace the hammermill. Pea gravel in two small hoppered-bottom steel bins drops to two short belt conveyors which feed both ends of the mill with the product discharging through ports in the center line of the shell. Two 5-in. Wilfley sand pumps pick up the mill discharge; one of the pumps is a spare. The pulp is pumped to a single-deck, low-head vibrating screen with $\frac{3}{16}$-in. wire cloth from which oversize returns to the rod mill. The minus $\frac{3}{16}$-in. product goes to a 60-in. Wemco sand preparation machine and from there to one of two steel hoppers that straddle the main car-loading belt conveyor. At the start of operations, the small bin is filled first, after which the larger bin is used. This permits a longer drainage time for the material in the smaller bin so if a drier sand is wanted it can be fed to the conveyor belt. The manufactured sand is blended with natural sand on this same belt. The rod mill, driven by a 125-hp. motor, grinds up to 45 t.p.h.

Like other producers in the Livermore area, this company has found that clay is an important trouble maker and operating practices therefore have been built around its removal. Digging under water with a 3-cu. yd. 3W Bucyrus-Erie walking Monighan is essentially the first step in a soaking process. The field hopper has been eliminated. A 1½-cu. yd. Marion shovel is available for stripping and for stand-by purposes.

When the 13-cu. yd. Euclid bottom-dump haulage units unload into the hopper serving the primary belt conveyor, the material can be flushed with fresh water as it proceeds over the reciprocating feeder. The feeder is a very novel unit. It has a front-hinged door to which is fastened a long arm that permits the operator to raise or



Flow sheet of operations at California Rock & Gravel Co. plant near Livermore

lower the door from the grizzly floor by means of a sheave and wire cable arrangement. A second feature is the use of guides to keep the material on the conveyor belt as it comes off the feeder. The width of the guides can be varied to suit the type of material; the amount of water in the matrix is one of the main reasons for changing the width. Just before the return side of the offbearing belt conveyor passes over the tail pulley, a liberal stream of fresh water keeps the belt clean and the water drains off to waste.

Like most of the other operations in the valley, the pit-run material is given a preliminary scrubbing, screening and dewatering. The soaked material on the first belt conveyor is delivered to a 6- x 20-ft. rotary scrubber to which is attached a cone-shaped screen. The first 6 ft. is 1¼-in. punched plate and the next 2 ft. is 3¼-in. perforated plate. Minus 1¼ in. flows to a 78-in. Wemco sand preparation machine used as a dewatering unit. The plus material falls to a belt conveyor serving the main final screening and washing plant. Overflow from this unit goes to a 4- x 30-ft. Link-Belt sand drag. The drags move very slowly, about 5 f.p.m. Wash water from other sources in the main plant goes to this same drag so it is essentially a fine sand scavenger recovery unit. About 3 t.p.h. of sand in the minus 50-mesh range are recovered.

In the final screening and washing section of the plant, a 4- x 14-ft. Allis-Chalmers triple-deck, low-head screen followed by a 5- x 12-ft. triple-deck screen is used. The accompanying line drawing gives the essentials of this set-up. The two sizes of natural sand are from the bottom deck of the Ty-Rock. This deck has ¼- x ⅛-in. and $\frac{3}{16}$-in. wire sections. The throughs from the top section flow to a 48-in. Wemco triple-pitch sand preparation machine, and the coarser material from the lower end flows to a second 48-in. unit of the same make. The two sands are placed in separate bins.

At the preliminary scrubber, the plus fractions are put through a No. 13 Superior McCully gyratory crusher and join the plus material from the 78-in. spiral. Under the final screening plant is a 3-ft. standard Symons cone secondary crusher. It receives the plus material from the top deck of the Allis-Chalmers low-head screen.

A new loading apron has been recently installed for car-loading. It uses a company-built reciprocating loading chute that oscillates at right angles to the long axis of the gondola. It gets its primary motion from an eccentric on the outboard end of the head pulley of the loading belt. Plant switching is done by a Browning railroad crane which also stockpiles and reclaims material from ground storage.

Frank W. Erlin is president of the company. T. S. Silva is plant superintendent.

Tracy Rock and Gravel Co. Plant

ANOTHER IMPORTANT sand and gravel producer serving the lower San Joaquin Valley is the Tracy Rock & Gravel Co. The market includes such cities as Stockton, Tracy, Modesto and Merced, with some shipments going into the San Francisco-Oakland areas.

The plant, now in its eighth year of operation, uses belt conveyors entirely for intraplant transportation. George French, Jr., the owner of the company, has obtained great flexibility by the use of cross belt conveyors and does not elevate his material unless necessary. Many of the belt conveyors operate almost parallel to the ground. Feeders under bins are short, belt-type units. Mr. French is also a contractor.

There are four crushers in the plant: the primary, a 10- x 36-in. Kue Ken, a product of the Straub Manufacturing Co., Oakland, Calif.; a 3-ft. Telsmith cone; a set of 24- x 42-in. Pioneer rolls; and a set of 30- x 18-in. Universal rolls. As the California Division of Highways proposes to use nothing larger than 1½-in. material, the operators are preparing to add more crushing capacity to the plant.

As the presence of clay is a problem common to practically all operators in the area, gravel is cleaned in a 6- x 20-ft. rotary scrubber. Crushed gravel is scrubbed separately in a 5- x 20-ft. unit. Recently a set of Eagle twin screws was added to the scrubber circuit to wash intermediate sizes of gravel before final screening. The use of a unit of this type to give added scrubbing capacity is unique, and its operating results, which now appear favorable, will be watched with interest. The pit is dry with sand and gravel ranging from 35 to 75 ft. in depth. Crushed gravel and uncrushed can be kept separate; both can be washed.

The plant is built close to the rim of a worked out section of the pit with a series of bins constructed in the pit so that the tops of the bins are about level with the ground elevation of the plant. Short belt conveyors finger out over to these bins. Road stone is processed in a separate section of the plant with the finished material sent to small bins or to trucks. Some finished material is stocked at plant elevation and some in the worked out part of the pit. For reclaiming, there is available a 304 Koehring crane, a No. 855, 1¾-cu. yd. P&H, a ¾-cu. yd. Bucyrus-Erie No. 22 shovel, a Haiss loader and two Wagnermobile front-end loaders.

One new feature of the operation is the use of a 5- x 10-ft. El Jay single-deck scalping screen. This is a heavy-duty screen made in Eugene, Ore., by the Johnson Co. Secondary screens used in the plants are Cedarapids, Symons, and Niagara units. A 6-ft. dia. Wemco sand preparation machine takes care of the sand recovery.

Washing section of Tracy Rock & Gravel Co. plant. Rotary gravel scrubber is located above sand preparation machine at left. Following scrubber is a classifying screen with the inclined belt conveyor delivering material to screws which are used to re-wash larger gravel sizes. Flat belt conveyors, to the right, deliver to bins on worked out floor of pit

Pit loading is done with a 38-B Bucyrus-Erie dragline that swings a 1¾-cu. yd. bucket. It loads to two 13-cu. yd. Euclid bottom-dump trucks. A Northwest backhoe is also available for incidental use.

The plant is located on the Western Pacific railroad, but a considerable volume of material is trucked from the plant. The operation includes a black-top plant, and a 150-cu. yd. per hour Noble ready-mixed concrete and dry batching unit.

N. J. Bonelli is superintendent.

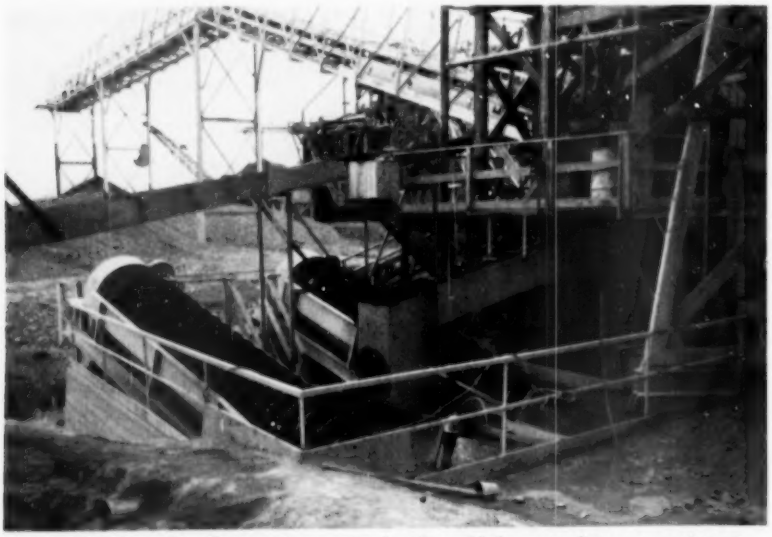
Fair Oaks—Pacific Coast Aggregates

ONE OF THE OLDEST AND LARGEST producers in the Sacramento and American river valley areas is the Fair Oaks plant of Pacific Coast Aggregates, Inc., on the American river some 12 miles east of Sacramento. The plant, built in 1909 and rebuilt in 1939, has been subsequently overhauled and revamped to keep it up to date. One of the more recent additions was the installation of two 48-in. Wemco sand preparation machines. Black top and especially ready-mixed concrete are important products here. A considerable volume of concrete for incidental construction is going to Folsom and Nimbus dams that are now under construction about 10 miles above Fair Oaks. No ready-mixed concrete is going into the dams proper, mainly because of the builder's requirements of a 6-in. top size aggregate. The Noble batcher at Fair Oaks is not equipped to handle that large aggregate. T. L. Smith mixers on International chasses are in use.

Earlier operations centered about river digging with spring freshets revitalizing the deposit. Some gold was and still is recovered in the plants although river digging stopped about three years ago. River digging was stopped mainly because when a spring freshet came roaring down the river it brought with it lighter river debris: roots and sticks, which tended to form in eddies in the pool resulting from digging. The wood fragments would become waterlogged and sink, contaminating the material to such an extent that it became extremely difficult to produce clean aggregates.

Production of 5- x 12-in. cobbles from the old gold-dredging ground goes out for riprap and levee protection work. Fair Oaks is supplying all the aggregate for Nimbus dam. The dam contractors will do the hauling.

Present sand and gravel comes from old gold-dredging ground with great volume of this material available. Most of the old dredges used a single stacker belt, and the fines went to short sluices and back into the pond. This put the coarse gravel on top of the sand. A second type of dredge used more than one stacker and the fines were spread over the top of the coarser material as a land rehabilitation measure. Pit selectivity can be practiced as both types of dredged ground are nearby and controlled by the company. Four Euclid and five Cobra wagons do the primary hauling.



Fair Oaks plant of Pacific Coast Aggregates, Inc., has added new sand recovery equipment

Healdsburg Plant—Basalt Rock Co.

THE HEALDSBURG sand and gravel plant at Napa, Calif., is one of 13 or more rock products operations owned by Basalt Rock Co. and affiliated companies that include plants for the production of sand and gravel, crushed stone ready-mixed concrete, concrete masonry, and artificial lightweight aggregate. One of the largest and most modern plants in the United States for the manufacture of an artificial lightweight aggregate is now in its final construction stages near Napa. A. G. Streblow, president of Basalt Rock Co., is very active in association work, and is now president of the National Concrete Masonry Association. E. F. Brovelli is vice-president of the company and the nominal operating head of the aggregate division.

Although the sand and gravel operation at Healdsburg is one of the older plants, it has not been allowed to deteriorate in any sense of the word. Each year some of the older sections of the plant have been rebuilt until today it is practically an all-steel-concrete structure of efficient design. The original plant, built in 1931, had a capacity of 150 t.p.h., but today the production rate is 500 t.p.h. One unusual feature of the plant is the production of four sizes of sand which later are blended in a reclaiming tunnel on a belt conveyor. The four sizes are: minus ¼ in.; minus ⅛ in.; plus ⅛ in. minus ¼ in., and a minus 16-mesh product. This finer product, however, has a high content of minus 50- to minus 100-mesh material, and receives its feed from the overflow of a duplex reciprocating rake-type classifier. The two largest sand sizes are produced by vibrating screens with the third size made by the rake unit. No trouble is experienced in blending the finer sizes of sand, using conventional gates to feed the materials to the blending conveyor belt.

Another variation from most West Coast operations is that the final screens are all mounted in a high steel gallery. Finished sizes fall to the storage area below with reclaiming tunnel conveyors for reloading. All coarser materials are given a final rinse before loading to trucks, railroad cars, or for use in the company's ready-mixed concrete plant. The operation includes a black-top plant.

Gravel and sand are excavated from the banks of the Russian river, but as this river is quite turbulent during four to six months of the year, it has been the practice to store above the high-water line from 500,000 to 1,000,000 tons of pit-run material. Two large stockpiles are used for this purpose, and the material is reclaimed by draglines.

Two pits are in use; one downstream from the plant employs a 4-cu. yd. 3-W Bucyrus-Erie walking Monighan with a Page bucket, and a 2½-cu. yd. American dragline is used upstream. The "walker" has an 80-ft. boom and digs to 40 ft. under water. There are available eight 13-cu. yd. (struck measure). Euclid bottom-

dump haulage units. Spring freshets replenish the sand and gravel in the pits to a considerable degree.

The first screen in the plant is a Seco scalper with the remainder of the screens being older Niagara units. Seven sizes of washed, uncrushed gravel are produced from the plus ½-in. minus 2½-in. gravel from the scalping operation. The plus 2½-in. minus 10-in. gravel is crushed to make five sizes of washed, 100 percent crushed gravel. A Traylor crusher and a set of 42- x 16-in. Traylor rolls handle the crushing. About 10 percent of the total pit-run has to be crushed.

The company serves a market area extending roughly 75 miles to the south and 200 miles to the north. A high percentage of the plant output is shipped in company-owned trucks with about 40 units in service, mostly Dodges.

James Kennedy is superintendent of the Healdsburg plant.

General view of Madison Sand & Gravel Co., Madison, Calif.

Madison Sand and Gravel Plant

ABOUT 30 MILES NORTHWEST of Sacramento is the Madison Sand & Gravel Co. plant, now operating in its second year. It is owned jointly by Harms Bros. and C. M. Syar. The former are well-known contractors in the area with affiliate companies operating ready-mixed concrete plants at Fairfield and Vacaville, Calif. They also have a Cedarapids hot-mix bituminous plant at Fairfield.

The sand and gravel operation at Madison might serve as an example of a relatively small plant duplicating what only larger plants are supposed to do. Three sizes of gravel are made with rock ladders used to stockpile the two larger sizes, plus ⅜ in. minus ¾ in., and plus ¾ in. minus 1½ in. These two sizes are reclaimed by belt conveyors in short tunnels with a rinsing screen at each belt station so that stockpiled material can be washed before loading. A 4- x 8-ft. Simplicity rinse screen is used for the ¾-in. top size gravel with a 4- x 8-ft. Niagara for the 1½-in. top size gravel. Wash waters from all rinse screens flow to a small pool alongside each station. Rewashing stockpiled material insures complete removal of any road dust that may have settled into the pile and any fines due to ravelling of any clay in the matrix, although clay is not a serious problem here. Crushed gravel can be kept separate from uncrushed and it can be washed if desired. Much of the plant's simplicity is due to the fact that no plus 6-in. gravel has been found in processing well over 100,000 tons of material. Most of the pit-run is in the minus 3½ in. range. Only one crusher is therefore necessary, a 3-ft. Telsmith Gyracone. Oversize from the primary Symons scalper can go to the cone crusher with the throughs going by short belt conveyor to a 4- x 8-ft. Simplicity double-deck screen mounted over a small, oval-bottom truck bin. Oversize can go back to the first belt in the plant. Stone dust is piped by gravity to a 60-in. sand preparation machine.

Following the Symons scalper is a double-deck Telsmith wet screen. It will be noted that sands from the lower deck of this screen flow to the 60-in. Wemco.

There is also a Pioneer portable plant that includes a 22- x 44-in. roll and a 10- x 38-in. jaw crusher. It is driven by a D-17000 Caterpillar diesel through a flat belt drive. The unit prepares dry road stone and plant mix. When preparing the latter, fines (for filler) can be added from a separate hopper that feeds by means of a cross belt conveyor to the main belt conveyor serving the Pioneer. This feed belt is driven by a small Wisconsin gas engine. About five to six percent filler, mainly top soil high in fine sand, is usually added to the plant mix.

Primary loading is by a Northwest dragline that carries a 2-cu. yd. Williams bucket. The bucket was originally a 1-cu. yd. unit but has been enlarged. Digging is to relatively shallow depths, below water for the most part. The dragline loads to one of four Caterpillar bottom-dump wagons, holding a 22- to 23-ton payload and powered with DW-10 Caterpillar tractors. The haul is about 700 ft. over relatively easy grades. Excess pit material is stockpiled alongside the primary feed hoppers for both plants, and can be pushed into the feed hoppers when needed by one of two D-8 Caterpillar tractors with dozers.

In addition to the reclaiming tunnel system, Model HM Hough Payloaders are available for the sand and pea gravel loading. These reclaiming units play an important part in the loading operations, for often 500 tons of material go out of the plant during the first morning hour. The plant has a capacity of 2000 tons in eight hours with a peak of 3000 tons. A large volume of the total tonnage is sold commercially. The plant operates five days per week and all materials are shipped out by trucks with truck weighing on 60-ft. Murphy scales. Water is supplied by an 8-in. dia. U.S. Pumps, Inc. deep-well pump driven by a General Electric motor. Willard Walker is superintendent of the operation.

Rocky's Notes

(Continued from page 77)

Community Centers." They describe in simple and attractive form how to organize local groups to study sound economics. Some of you who have sons and daughters in school and college may have read some of the current textbooks on economics or political science. If so you have probably noted that several of these give a rather pinkish slant on things. That was the fashion in college circles when most of these texts were written, and possibly is the prevailing fashion in some of our schools of "higher learning" today.

The address of the Committee for Economic Development is 444 Madison Ave., New York 22, N.Y. From the membership list of its business-education committee, it would seem that it can recommend programs for study and research which would deal with the subject fairly from all angles. We can not overcome leftist propaganda by simply shouting against it. One has to be informed to distinguish between propaganda and sound and genuine economics.

Leases Gravel Property

CHARLES F. MCNAMEE, Xenia, Ohio, has secured a 10-year lease on 12 acres of land on city-owned gravel property near Xenia. Terms of the lease provide that the city be paid a royalty of 16.2 cents per ton of gravel removed from the property, with a minimum of 30,000 tons to be removed annually. Mr. McNamee is the owner of McNamee Ready Mixed Concrete Co., Xenia, Ohio.

Drying Plant

PIONEER SAND & GRAVEL CO., Seattle, Wash., plans to build a $50,000 sand and gravel drying plant. Plans call for a steel-frame and wood structure 26 x 69 ft., including a bin.

OUTLOOK—

Producers Views Indicate Active 1953

Anticipate increase in volume over 1952

Many companies report plans for expansion

By BROR NORDBERG

OUR YEAR-END, INDUSTRY LETTER, requesting comments on business conditions, plans for modernization and expansion of productive facilities, and opinions on the probable effects of the election, brought forth more expressions of optimism than any similar letter in many years. The rock products and concrete products industries, with few individual exceptions, view the years ahead as very promising for business. They anticipate that we will have an administration in Washington favorable to business during years when we also will have heavy demands for products of the industries. It is expected that the new administration will soon get around to removing or changing regulations that have made it difficult to earn reasonable profits due to spiraling costs.

Regardless of the timing of this expected change in government policy, and Washington's decisions to come later that will affect the volume of federal and other classes of construction, the year 1953 is expected to be a record-breaker. A summary of the predictions from producers of all classes of aggregates, portland cement, ready-mixed concrete, concrete products and lime, principally (including a few from other non-metallic minerals producers), indicates that volume of business for both the rock products and concrete products industries in 1953 should comfortably surpass that for 1952. The year 1952 was a peak year. Fifty-nine percent of the total expect that volume of business will be equal to that experienced in 1952. Another 18 percent indicate that volume will definitely be considerably greater, and 8 percent expect the same or slightly increased volume. Nine percent expect a slight reduction, and the remaining six percent will have reductions in the range of 10-40 percent (average 15-20 percent.)

Of the total who made these predictions for their individual businesses, 57 percent also reported that the year 1952 had ended with an increase in volume over 1951, and 20 percent reported the same volume.

Many companies which predict that 1953 volume of business will be equal to 1952 figures, will operate at capacity for at least another year. Very few indicated a tapering off in the last half of the year, as had been so widely predicted for business in general by forecasters a year ago. Forecasters had put emphasis on the extent to which defense spending would bolster the economy, with the peak to end about mid-1953, in predictions made during the past year or two. The predicted tapering off, as defense spending is cut, is to affect some plants in the industry where 1952 volume was extraordinary because of construction on big defense projects but business volume will remain good. In most affected areas, other classes of construction will compensate for this loss and, in cases, will result in an overall increase in volume. It works in reverse, too, a few producers expecting defense projects in 1953 to offset declines.

Typical of the producers who predicted a reduced volume of business are the sand and gravel producer who says his volume will be slightly reduced in 1953. However, his 1952 dollar volume of business had exceeded his 1951 volume by one-third and was a new record when, a year ago, he had predicted no change in comparing the years 1952 and 1951. Another example is the crushed stone producer in New York State who had enlarged production to break his all-time record by far, principally because of airport construction in the area.

A few aggregates producers called attention to the effects of the many freight rate increases on their business which might prove serious should a time come when construction be generally reduced. As an example, a sand and gravel producer in Pennsylvania said that, whereas he had customarily shipped 50 percent of his production by rail, he now ships 99 percent by truck. His range of shipments has been reduced so as to sharply restrict potential customers. Thus far his volume has continued good. Others have noted a trend toward more branch plants, including portables, due to high freight rates.

Strikes in 1952 had serious effects on business for some producers but will also have the effect of bolstering 1953 volume because of deferred and carried-over construction. Strikes affecting construction were particularly serious in California and the Pacific Northwest. In California, a combination of the strikes of the steel industry, carpenters and operating engineers along with two months of wea-

EXPENDITURES FOR NEW CONSTRUCTION IN CONTINENTAL UNITED STATES
Estimate for 1952 and Forecast for 1953[1]

Type of Construction	1952	1953	Percent of Change
Total new construction	$32,318	$33,500	+ 3.7
Private construction	21,681	22,200	+ 2.4
Residential building (nonfarm)	11,029	11,450	+ 3.8
New dwelling units	9,820	10,200	+ 3.9
Additions and alterations	1,026	1,050	+ 2.3
Nonhousekeeping	183	200	+ 9.3
Nonresidential building (nonfarm)	4,945	4,600	— 7.0
Industrial	2,289	1,650	—27.9
Commercial	1,101	1,400	+27.2
Warehouses, office and loft buildings	479	575	+20.0
Stores, restaurants and garages	622	825	+32.6
Other nonresidential building	1,555	1,550	— 0.3
Religious	397	425	+ 7.1
Educational	354	375	+ 5.9
Social and recreational	125	150	+20.0
Hospital and institutional	388	350	— 9.8
Miscellaneous	291	250	—14.1
Farm construction	1,700	1,700	———
Public utilities	3,925	4,350	+10.8
Railroads	400	425	+ 6.3
Telephone and telegraph	550	575	+ 4.5
Other public utilities	2,975	3,350	+12.6
All other private	82	100	+22.0
Public construction	10,637	11,300	+ 6.2
Residential building	643	575	—10.6
Nonresidential building	4,104	4,250	+ 3.6
Industrial	1,649	1,700	+ 3.1
Educational	1,618	1,775	+ 9.7
Hospital and institutional	478	375	—21.5
Other nonresidential building	359	400	+11.4
Military and naval facilities	1,355	1,600	+18.1
Highways	2,740	3,000	+ 9.5
Sewer and water	686	725	+ 5.7
Miscellaneous public-service enterprises	202	200	— 1.0
Conservation and development	843	875	+ 3.8
All other public	64	75	+17.2

[1]Joint estimates of construction made by the Department of Labor and the Department of Commerce.

ther that practically stagnated construction was reflected in 1952 volume for some but will improve the total for 1953.

Weather has been an important factor in great increases or reduction in volume. The cement shortage grew in seriousness toward the end of 1952. A number of producers say that 1952 volume was depressed due to shortages of cement curtailing construction where volume might otherwise have exceeded that for 1951. Much of this deferred construction is carried over into 1953 but they fear that the cement shortage might carry through 1953.

The foregoing general observations apply principally to producers of aggregates, ready-mixed concrete and concrete products.

Producers of ready-mixed concrete and concrete products have expressed great concern for the cement shortage, being direct purchasers. There were serious and prolonged shortages of cement in 1952 which resulted in curtailments of production and there were cases where ready-mixed concrete production was stopped for failure to obtain cement from any sources. This represents the sixth consecutive year in which the ready-mixed concrete industry has been handicapped by a cement shortage, according to the National Ready Mixed Concrete Association, in spite of great increases in capacity made by the portland cement industry. Serious strikes in the cement industry were the main contributing factor, notably in Ohio and in important eastern producing areas.

In the face of this depressing influence, the ready-mixed concrete industry continues to grow in numbers of plants and in volume of production. There are many cases where producers have reported that each year has surpassed in volume of sales the preceding year, in some cases ever since the business was started.

Our letter returns indicate that the portland cement industry will again continue at capacity which would mean that shipments might equal or exceed the estimated 245 million bbl. shipped in 1952. This, incidentally, is the eighth consecutive year that cement shipments have increased.

The slag industry was, of course, hit by the steel strike in 1952 with the result that tonnage was possibly 10 percent less than in 1951. In 1951 the industry had an all-time record output of 29,327,434 short tons, according to Bureau of Mines figures, and showed increases in all classifications. Expanded slag had increased by 21 percent over the previous year to a high of 2,068,492 tons, the bulk being used for concrete masonry units. The outlook for 1953 is for a tonnage comparable to 1952 with possibility of some increase.

The one industry that views the years ahead with some apprehension is the agricultural limestone industry

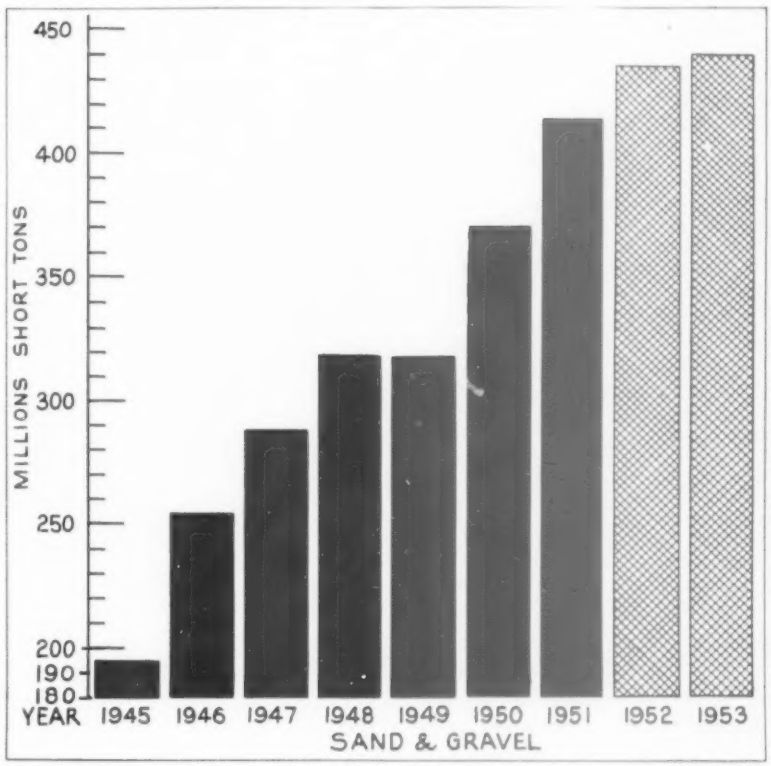


Chart showing total production of sand and gravel from 1945 to 1951 with an estimate of 1952 and a probable projection of production for 1953 based on reports from the field

which is concerned lest the new administration in Washington might discontinue or sharply curtail A.C.P. appropriations after the 1953 fiscal year. The question is whether or not this payment-type program is to be considered as basic or expendable by the administration as it moves to effect economies in government. Many believe that established programs that have had the support of both political parties and have proved their worth will not be subject to out-right elimination. It looks right now as if there will be a reduction. For some agricultural limestone producers, but definitely a minority, this is not considered serious because effective merchandising has resulted in farmer customers being willing to pay out-of-pocket for agricultural limestone.

All branches of these industries are concerned about prices and are crossing their fingers that the new federal administration will let price controls expire early in 1953, along with other restrictive measures. Most aggregates and concrete producers expect prices to hold the same levels in 1953, regardless of restrictive measures, because of the combined effects of competition and taxes. Some say that taxes will hold prices up; others say that while they require higher prices because of increased operating costs they cannot raise prices (aggregates) or they will lose business to portable plants. Still others say that competition is already such that prices could not be boosted above today's ceilings even if they be removed, and there have been a few cases, in 1952, of prices below ceilings.

The portland cement industry's position with respect to prices is expressed in this quotation from a letter received from a large midwestern manufacturer:

"On prices for our products, we do not look forward to any substantial upward revisions. It seems to us that price movement in our industry will depend largely on what is done with the existing so-called excess profits tax. If the excess profits tax is allowed to expire it may well be that there will be few changes in prices.

"It is a fact, however, that present selling prices are on the low side. This is despite the fact that most of the companies are showing substantial earnings. The explanation lies in the industry's continuing need for large-scale replacements and improvements. These replacements cost today three or four times the original cost. As a consequence, replacements cannot be wholly financed out of amortization funds. A substantial portion of the cost must come out of retained net earnings. This holds down dividends to the owners and, at the same time, builds up the investment in the business to the point where the current

earning level becomes inadequate. It is safe to say, we think, that many plans for replacements and rebuilding are being shelved because sufficient funds are not available, or because the earning level does not adequately support the enlargement investment involved."

All classes of producers have expressed concern for prices. Reports of increases in dollar volume in terms of 10 or 20 percent for 1952 over 1951 have resulted in no increase in net profit. Those who reported the same volume have found themselves with less net income.

Distribution of Business

One of the most significant findings in our survey is the extent to which highways and other public construction are expected to offset declines in other classes of construction. Of those who commented on classifications of business as expected in 1953, 93 percent (in numbers) said that highway construction will increase and 86 percent said that other forms of public construction will be higher than in 1952. On the other hand, 64 percent expect a decline in residential construction. Commercial construction is expected to increase according to 63 percent of the producers whereas only 40 percent expect industrial construction to gain in 1953.

It will be recalled that on June 11, 1952, Congress passed an all-time high, federal-aid highway bill authorizing federal aid of $575 million for each of the 1954 and 1955 fiscal years. This calls for state participation and the states are taking steps to raise the funds for matching, so that they may participate to the fullest while also enlarging their overall programs. In states where such action has been taken, or is imminent, it is being reflected in aggregates plant expansion and modernization for the coming year's business.

The toll roads under construction and planned will require enormous tonnages of road-building materials. It is said that the New York State thruway, from New York City by way of Albany to Buffalo, will be entirely under contract by March 30, 1953. This project alone involves 430 miles of highway building. New York State's program is the biggest road-building program in American history.

The pressure to improve our highway system is starting to bring results over the nation, and it is encouraging that General Eisenhower has gone on record as recognizing highway construction to be second only to actual military requirements as of importance to national defense. It is expected that road-building will increase from a $2.7 billion volume in 1952 to $3 billion or possibly slightly more in 1953.

Construction in 1953

New construction in 1953, according to the U.S. Labor Department's Bureau of Labor Statistics and the Building Materials Division, U.S. Department of Commerce, likely will reach a new peak. Volume is expected to exceed, by $1 billion, an estimated $33⅓ billion for 1952. This prediction is based on the assumption that materials will be plentiful and that international developments will not be upsetting.

According to these figures, new private construction will reach a peak of $22.2 billion in 1953 and there will be a million new dwelling starts. Commercial building is expected to increase 27 percent in 1953 due to improved materials availability and the removal of credit controls. Construction is considered to be one of the brightest spots in the entire business picture next year. Estimates of construction activity for the years 1953 and 1952 for some 30 types of construction activity are shown in the table on page 102.

Producers almost without exception expressed themselves as happy with the national election. They feel that we now will have stability and conditions healthful for business and look for restoration of the principles of free enterprise. Obviously, there is a good psychological effect and the impression is that the ending of political uncertainties will stimulate an upswing in industry.

It is also felt that there will be no sudden curtailment of construction programs generally approved by both parties. However, we might look for some reduction in public housing and federal power projects a little later. The new administration has already endorsed highways, flood control, and navigation and reclamation projects. It is believed that corporate and individual taxes will be reduced by January 1, 1954, and that excess profits taxes might be ended June 30, 1953. Controls over prices and wages expire April 30, 1953, and June 30, 1953, respectively, and it is likely they will not be extended.

Among the comments on the outlook for business, typically, were the following:

Sand and Gravel (Detroit, Mich.):

"Our outlook for 1953 is about the same as for 1952. We have been running at capacity all season and as far as we can determine at this time we will do the same in 1953. There will, no doubt, be some shifting of demand from residential and commercial to a greater percentage for highways and other public works."

Sand and Gravel (multiple plants in midwest):

"We anticipate the volume of business for 1953 to be as great as the business which we experienced in 1952. Under the price regulations we intend to maintain the ceiling prices which we have been charging for the past two years. We further anticipate that the division of business will remain constant, with 50 percent of our production going to highways and other public works; 20 percent of our production will be railroad ballast, and 30 percent will be diverted to residential, commercial and industrial construction.

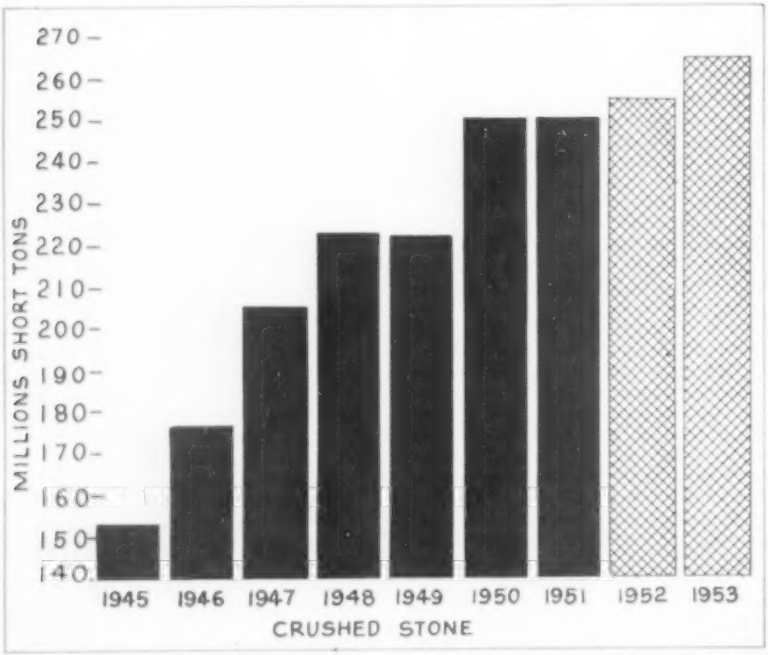


Chart showing the very substantial increase in crushed stone production since 1945. Figures for 1952 and projection for 1953 are estimated. Stone production for lime and cement is excluded

"Our business in 1952 to date has been slightly ahead of our production for 1951 and the division of this business is the same."

Sand and Gravel, Crushed Stone and Ready Mix (Minn.):

"I believe the volume of business for 1953 will compare favorably with 1952. However, there is a possibility of a dropping off during the second half of 1953.

"Our distribution for 1952 was as follows:

Building

Residential	25 percent
Commercial	26 percent
Industrial	20 percent

Streets, Roads, Bridges and Sidewalks

New construction	8 percent
Maintenance	16 percent
Miscellaneous	5 percent

"We expect to see a slight decrease in residential, commercial and industrial building during 1953, but an increase in highways and other public works.

"Our business in 1952 was approximately 5 percent greater than in 1951, and the distribution percentage-wise was very close in 1952 to what it was in 1951.

"Our area has not been blessed with very much new defense construction. Minnesota is the 47th state in terms of money spent for new defense construction. This may be a blessing to us, in that we can adapt ourselves quicker to conditions as the defense spending tapers off."

Sand and Gravel, Ready Mix (Texas):

"It is anticipated that the volume of business for 1953 will compare favorably with 1952. Although we do not anticipate any particular increase, we look for it to hold its own. As far as prices are concerned, I do not see how they can go down until after taxes and other items go down. It is difficult to classify our anticipated market. Residential for 1952 was below 1951, and we anticipate a slight decrease, but we anticipate an increase in industrial, highways and other public works, and we do not see any particular decline in our area, of governmental construction."

Sand and Gravel (Penn.):

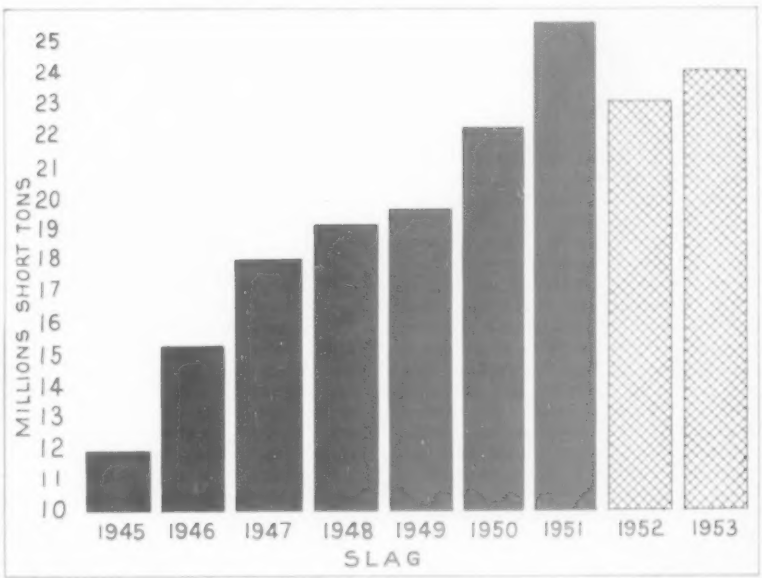
"As a result of the six or seven freight rate increases granted the railroads in recent years, our business has changed from approximately half by rail and half by truck to about 99 percent by truck. This limits us to nearby markets and greatly restricts the number of our potential customers.

"A year ago, we would have written you that we expected 1952 business to be about the same as that of 1951; but actually we did about one-third more from the standpoint of dollar sales. About half our business goes to asphalt paving customers, who mix our crushed gravel and special bituminous sand for sale to the State of Pennsylvania.

"Two ready-mixed concrete customers take about 25 percent of our sand and gravel production; and the rest of our business is pretty well scattered to the State and other miscellaneous customers.

"We never know this time of the year just what State Highway projects will be bid, in the year ahead; thus it is difficult to predict that far in advance.

"We can think of 1952 as an unusually good year, and our guess would be that 1953 may not be quite as good."



Slag production has shown rapid gains since 1945. The decline for 1952 resulted from the steel strike. Slag figures cover screened, air-cooled and granulated products

Sand and Gravel (Miss.):

"Personally, I think business is going to be alright in our industry. You know that we have not been able to skyrocket our prices like steel, rubber and labor because we did not have the legislation behind us; but we did increase our volume to the extent that we have come along okay even with high-priced repair materials and a rather constant selling price. We have used more machinery and fewer men. Our men on the payroll are higher priced men, more skilled but fewer, so in dollars and cents our labor costs per ton are not up too much. We do not expect much change in 1953 over 1952 or under 1952. We think our volume is going to be about the same and divided about the same. Homes may be down some but highways are going to be up some.

"Our 1952 year will be about 15 percent better than 1951, not from any particular source or market but from increases here and there and if I do say so we were just a little luckier this year than last. This is generally true of all the plants in Mississippi. We had a mild winter last year. Our rainfall in 1952 has been very light and more work was done; all of these things helped."

Sand and Gravel and Ready Mix (Ind.):

"We anticipate as much business in 1953 as we have had this year. This opinion is based on carry-over and local engineers' estimates of work on the drawing boards. In 1952 our deliveries were as follows:

Residential	29 percent
Commercial	37 percent
Industrial	30 percent
Public Works	6 percent

"There is no reason to believe that a substantial change will materialize in any division in 1953.

"As of November 30, business in 1952 is seven percent under 1951 due entirely to cement shortages. We are convinced, that with an ample supply of cement, we would have sold more yardage in 1952 than in 1951. This accounts in part for the carry-over business above mentioned."

Sand and Gravel, Ready-Mix (Southern California):

"Volume of business for 1953 should equal or exceed that of 1952 for the following reasons:

(a) Two months of unusually severe weather virtually brought construction to a standstill in our area.

(b) Local work stoppage due to a strike of operating engineers in the construction industry shut down virtually all construction in June of 1952. This coupled with the effect of the 53-day steel strike has had a depressing effect on volume during the remainder of 1952.

"Division of business percentage-

wise will not change too drastically. We look for a slightly stepped up program on highway and public works with some small curtailment of residential construction.

"Prices in 1953 should advance slightly as government controls are removed. We have been forced to absorb increased freight and transportation charges (which are an appreciable part of costs in heavy goods such as ours) due to O.P.S. regulations. If these regulations are allowed to expire, we hope we can reflect these increased costs in selling prices.

"Our business operates on a calendar year and we do not have final figures for 1952 available. Indications are, however, that sales volume for 1952 will fall approximately 15 percent below 1951. The distribution of the business was quite comparable although reflecting a decrease in residential construction and a slight increase in engineering construction. It must be remembered that much of the federal construction was in dislocated areas which could not be serviced from commercial rock plants or concrete proportioning plants adjacent to the Metropolitan area. As a result, not too great a proportion of the stepped up defense construction program was reflected in our sales."

Sand and Gravel (Ind.):

"Volume in 1952 was practically the same as in 1951. Percent of profit was lower in 1952. Material shortages and unsettled labor conditions reduced 1952 earnings."

Crushed Stone and Lime (Okla.):

"I think our volume of business for 1953 will not be any greater and perhaps some less than 1952. I think there will be more highway construction and other public works and less residential, commercial and industrial.

"Volume of business for 1953 and future years will be largely affected by government action which now appears to be designed to curtail expenses. Profit-wise our business may do as well even under curtailed operation if the tax situation becomes more lenient and the attitude of labor more cooperative."

Crushed Stone (Missouri industry):

"Much pride will be taken by Republican leaders in cutting out 'frills and decorations' which they believe are not essential to good federal government.

"This does not mean, however, that the Republican party intends to drastically reduce important federal programs such as the social security program, federal road building, aid to public schools, the farm program, a strong military organization and an abundant United Nations.

"Generally speaking, Republicans will not change our present form of government but they are obligated to make an honest effort to cut expenses wherever possible. In effect, citizens of the United States will have the same governmental diet as compared with the New Deal and Fair Deal—with the exception that desserts and some tasty side dishes, relishes, etc. will be eliminated.

"This means that the volume of business and prices for 1953 will remain constant or be improved as compared with 1952. If there is a marked change to the better or worse, it would have happened had the Democrats been reelected.

"Throughout Missouri, business was better during 1952 than during 1951. This was due largely to more favorable weather conditions in 1952 which was a dry year in most parts of this state. Business was affected negatively in some parts of the state due to dry weather because of drought effects which always depress business.

"We are looking forward in 1953 to increased volumes of business but with stressed labor conditions and more pricing problems."

Crushed Stone and Agstone (Wis.):

"As to the volume of business and prices for 1953, we feel that in our territory the volume should be about the same, although our costs will be a bit higher due to increased wages granted this past year. We are going to try to hold the line on wages for 1953 inasmuch as we do not feel that the market for our product will stand any increase. This has been brought out to us very definitely by the fact that some of our contractors and regular customers on driveway material have gone out into the country and dug out what we call 'farmer gravel' for the bulk of the driveway and then just topped it out with a good grade of crushed stone. We feel that any raise in price would only encourage this and we would find ourselves getting back to street and driveway beds of ashes, cinders. foundry sand, and whatever material might partly suit the purpose."

Crushed Stone, Sand and Gravel, Ready Mix (Ill.):

"It is our opinion that the volume of business and prices for 1953 should compare very favorably with the year just ending, even though the physical volume of construction has been impressive during the past 12 months. Industrial and commercial construction will, we believe, follow the pattern of defense spending, which those closest to the program indicate will reach the peak of expenditures during the later part of the year. Any reduction in this type of construction may be off-set in part by the increase in residential and highway construction, supplemented by public works.

"Supporting this belief has been the national down trend in private home building, which started in 1951, and which has put on an erratic performance during 1952. Much of this decline has been induced by restrictions on materials and the availability of mortgage credit.

"The importance of this decline has been recognized by the revised Defense Production Act, passed in June, 1952, which provided for a reduction under certain conditions of the down-payment requirement on homes, and with the easing of material restrictions, the trend of housing construction may be reversed. Certainly the market is still here, and the saturation point for housing is still remote.

"The new administration, we believe, will have a more favorable attitude toward business, and for that reason government regulations should prove to be less restrictive. The quality, character and ability of the administrative appointments appearing in the daily press supports this contention, regardless of one's political beliefs. Delivery of new equipment should be more prompt as the defense program levels off, and more steel is available for civilian use."

Crushed Stone and Agstone (Kans.):

"I expect business and prices to hold steady for the next six or seven months. I believe that appropriations for government participating projects will be curtailed particularly by John Tabor. Agriculture payments, highways and other public works will be curtailed and in 1954 will be sharply reduced in scope. The agricultural program, particularly in agstone and fertilizers, may be entirely eliminated.

"It may be that we are somewhat prejudiced but, our business was born in and through the liberal policy of the administration which has been in power over the last 20 years. I do not believe that the present administration and the Congress is friendly to small business and labor. I am thoroughly convinced despite the overwhelming support for Ike in the middle west, neither he nor Congress will be favorable to agricultural and agriculture practices."

Crushed Stone, Sand and Gravel, Ready Mix (Md.):

"We anticipate an increase in 1953 over 1952—our guess would be 20 percent. We feel that our commercial, industrial and highway public works will increase 30 percent or 40 percent, and residential will slow up.

"We have been modernizing our plants quite a lot this year, especially in the last six months in anticipation of the business for 1953. We expect to buy more equipment and still modernize in the first quarter of 1953.

"Business in 1952 was much better than in 1951, and the market of 1952 showed more of an increase toward highway and public works than 1951.

"We feel that in our area, business as a whole will be very good for the next three years, and as a summary of the above, we are spending a lot of money, doing a lot of planning in anticipation of a greater volume of

business. Our organization stays close to the market, and a number of us are connected with civic organizations and try our best not to make a mistake."

Agricultural Dolomite (Fla.):

"Since our type of operation is tied in so closely to the agricultural industry of western Florida, our performance during 1953 will depend greatly upon the prosperity here, of the cattle, citrus and vegetable growers, since our sole product is agricultural magnesium limestone.

"We believe the volume of our business will be greater in 1953 than 1952, due to the natural growth in demand for our product and services in this area. Our prices are about the same as pre-war and should remain about the same next year, even if the new Administration is able to bring about a reduction in federal taxes and prices generally. It appears that our 1952 volume will show about 20 percent increase over 1951.

"Although many of our customers are taking advantage of the Federal Soil Conservation program which includes some reimbursement for the application of agricultural limestone, we do not believe a reduction in government expenditures for this purpose would have a serious effect on our business. Most growers now realize the importance of liming to a well balanced overall fertilizer program. In fact, I have read recently, comments from certain Florida growers who would prefer not to accept government hand-outs to pay for practices that any good operator would follow at his own expense. These men would prefer a reduction in taxes because they say that for every dollar the government doles out it takes back three in taxes.

"It is our humble opinion that a true peacetime prosperity is possible, where the prosperity of every man is based on the quality and quantity of his production, accomplished by the use of his brains, or brawn, or both, plus an unqualified faith in God."

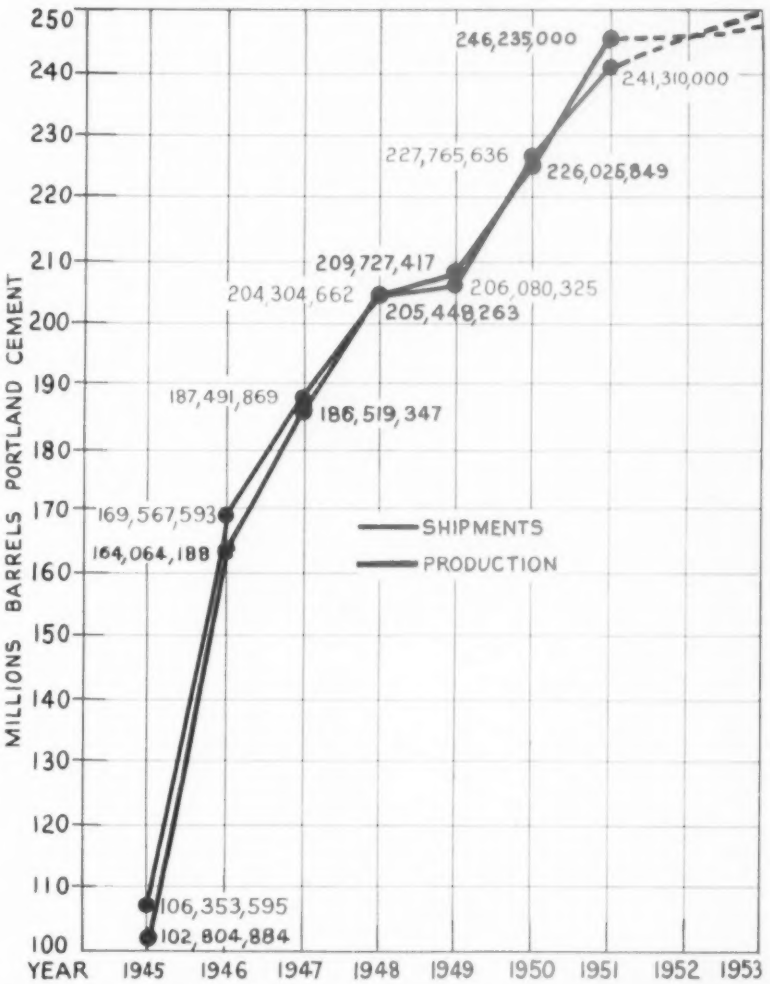
Crushed Granite (Ga.):

"We expect a 10 percent to 20 percent decrease largely in residential construction. We expect about the same demand for commercial, industrial, highway, and general construction.

"In 1952 we had about 10 percent higher tonnage and prices were about the same. We experienced increased labor and material costs. The larger part of increased tonnage was for concrete products, primarily block using a higher percentage of stone fines.

"I do not feel that our area has caught up with any form of construction or development but think the residential construction has advanced far enough so the next year will bring a more conservative approach. Much remains to be done with slum clearance as well as low cost housing.

"Industrial inquiries indicate a continued trend to branch plants due no doubt to increasing freight rates which is further evidenced by greater percentage of products being trucked."



Portland cement production and shipments curves show the very close margin between demand and supply covering the years from 1945 to 1953, inclusive

Slag Industry (nationally):

"It is my opinion that the volume of business and prices during the forth-coming year, 1953, will not differ much materially from the record for 1952. Possibly we will have an increase in tonnage, as the steel strike during 1952 was responsible for the loss of some sales. Highways, railways and public construction will continue to be the important factors for use of slag, and, of course, the concrete products field will be the important outlet for expanded slag in the lightweight aggregate field. It is my opinion that the slag tonnage for 1952 will be slightly under that of 1951, due to the steel strike already referred to. This may amount to as much as a 10 percent decrease in tonnage.

"Due to the favorable findings at the Ohio Agricultural Experiment Station, reported in Research Bulletin No. 708, concerning blast furnace slag as a soil amendment in the form of liming material, it is expected that the use of slag for this purpose—particularly the granulated type—will be materially increased in future years."

Portland Cement (company with multiple plants):

"We believe 1953 will be a transition year. The top management in our government is changing and the new administration will need a period of orientation in which to assemble and evaluate facts and formulate new policies.

"However, there seems no doubt that the faith of our people in the free enterprise system as against socialism has been restored and that they expect a government of laws rather

(Continued on page 192)

NATION'S OUTSTANDING NEW

Complete view of plant—secondary crushing plant to the right; screening and blending to the left; dust collectors may be seen in the middle

Richards Spur, Okla., plant of Dolese Bros. Co. has flexible blending system for balanced production to meet multiple specifications. Hydraulic dust collectors, safety and many cost saving ideas incorporated into design

MANY YEARS OF OPERATING EXPERIENCE have been incorporated into the design and construction of a new crushed stone plant by Dolese Bros. Co., Oklahoma City, Oklahoma, which is unquestionably the finest high capacity plant to be built in many years. From the standpoint of design, operating ideas and refinements, the plant is many years in advance of the industry. Its location is at Richards Spur, about 90 miles southwest of Oklahoma City, on the Rock Island Railroad. Dolese has been producing crushed limestone products at this location continuously since 1907.

The new plant replaces one destroyed by fire in September, 1949, and has been in production since November, 1951. During the interval, until the new plant could be designed and built, a portable plant was pressed into temporary service to fill the more urgent orders at a rated capacity of 200 t.p.h. on an around-the-clock basis.

Capacity of the new plant is rated at 750 t.p.h. in producing crushed stone products to meet varied and numerous specifications in the size ranges up to a maximum of 2½ in.

Specifications in Oklahoma and in North Texas and the nearby Texas Panhandle have been consistently trending to more and more of the smaller sizes of crushed stone. Demands for multiple sizes, close tolerances between sieve sizes, and overlapping products in supplying the different purchasers, are complicating factors to sustained production.

It is not uncommon to have simultaneous orders calling for the production of ten or twelve sizes of specification materials all below 2½ in., which only a well equipped and flexible plant of large capacity could possibly meet. All grades of commercial crushed stone for both portland cement concrete and asphaltic concrete construction, road base, topping, chips, railroad ballast and agricultural limestone are produced at Richards Spur. All specifications are for unwashed materials.

The great number of variations in size specifications and the continuing trend to demands for smaller sizes of crushed stone led to a plant design that is unique for its flexibility to compensate for any specification change. The company took the position that there should be no compromising with customers on specifications and set out to build a plant that could meet any reasonable requirements of specifications and with a minimum of rejections.

An accurately controlled system for blending is the key to balanced production in meeting the many grading specifications. Every product over ⅜-in. top size with the exception of a ¾-in. traffic bound road stone is a blended material. To accomplish this, seven basic sizes of stone are screened into separate "balancing bins" from which the required sizes and amounts are drawn in various combinations at controlled rates in blending the finished products.

The electrical controls, interlocking sequences, switches and signals for the screening and blending operations, and for the entire plant as well, are in a pressurized tightly sealed central control room which is the control center for all operations. This feature of the plant is the most comprehensive and fool-proof, yet simple, system of electrical control in any commercial crushed stone plant.

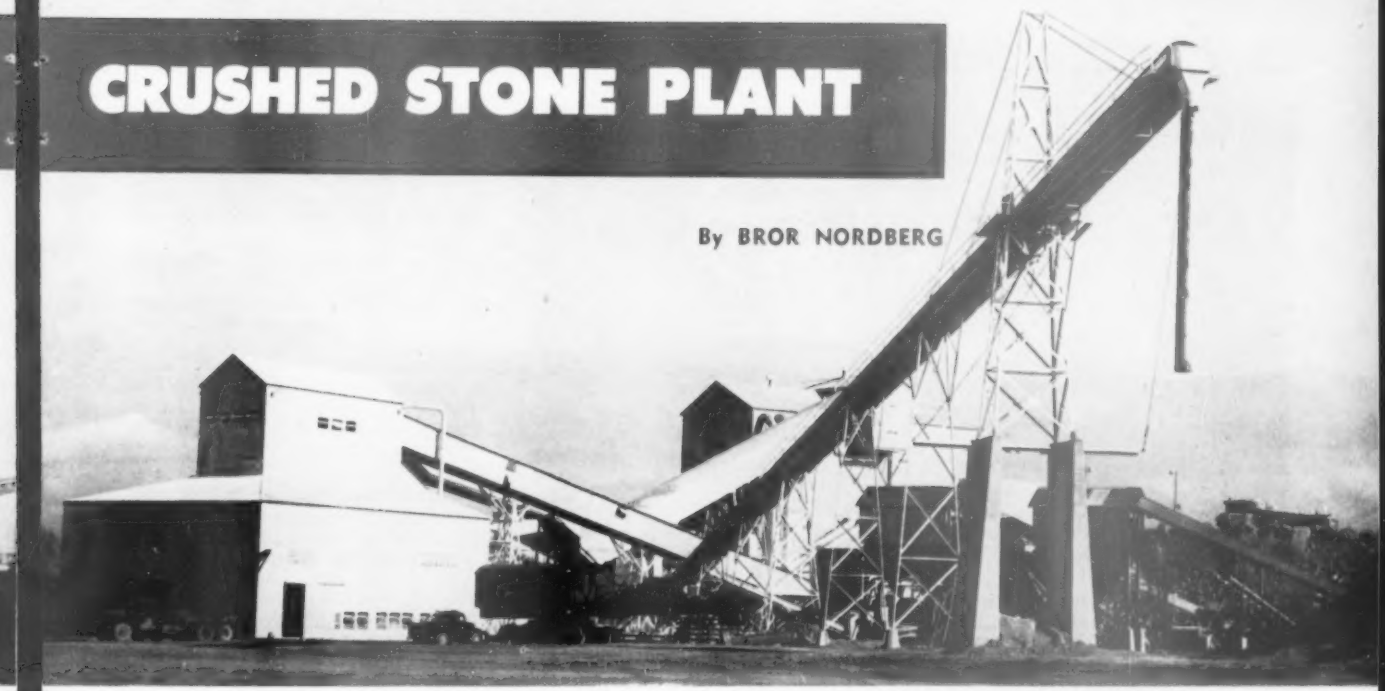
Plant layout consists of three major production units: (1) the primary crushing station; (2) the secondary crushing building; and (3) the screening and blending plant. Intra-plant transportation is entirely by inclined belt conveyors. The primary crusher has been in service for many years and is on its original foundations. Secondary crushers were salvaged from the fire. All buildings and the entire screening and blending plant are entirely new.

This plant differs from many other large crushed stone plants of recent date in the absence of surge piles of partially processed materials. It was preferred to provide intermediate bin storages within the plant and to balance production between sizes rather than to re-locate the primary crusher.

Surge bin storage over the secondary crushers totals 660 tons, the balancing bins (7) hold 420 tons and finished bins (14) have a total capacity of 3500 tons. Production is controlled according to market requirements for direct loading into railroad

CRUSHED STONE PLANT

By BROR NORDBERG



Secondary crushing plant to the left; blending plant is in the background; and primary crushing plant to the right. Stacking conveyor to the right

cars and trucks, with minimum stockpiling and rehandling. Primary crusher output is regulated to fit the capacity requirements of the screening and blending plant.

The plant structures are of extra heavy construction and there is practically no vibration. No wood has been used in the entire plant. The screening and blending building is supported by heavy wide flange section steel columns set on 2½-in. thick rolled steel plate bases supported by reinforced concrete footings. An estimated 1200 tons of structural steel were required for support of the building, framework, and bracing. Some of the I-beam columns are 30-in., 190-lb. sections. Sidewalls and the roofs are of corrugated galvanized iron, and bins are of heavy steel plate, reinforced against buckling by steel beams. The corrugated siding is attached to the structural frame with Ramset studs to assure firm attachment of the siding. The end of the Ramset stud is threaded and the sheet is attached with lead washer and nut. This is to prevent air vibration from blasting from loosening the sheets. The screening and blending plant, which measures about as high as a ten story building, is 40 x 114 ft. in dimension, and the structure was designed to withstand wind loads up to 120 m.p.h. Adequate daytime lighting is supplied through windows, and the central control room is air sealed and equipped with fluorescent lighting.

Safety was a prime consideration in the design of the plant. Every piece of moving machinery has substantial safety guards. All walkways and landings are of steel plate and stairways are of steel channels and concrete fill construction, with sturdy hand rails throughout. Wide aisles and generous clearances were basic to the design, as a safety measure and to facilitate maintenance.

WE HEREBY EXPRESS OUR APPRECIATION to President Roger Dolese and Executive Vice-president Vernon Gossi for having granted us the privilege to visit the Richards Spur plant personally, and to publish this article as a result of our special trip. We also thank general superintendent Walter S. Knox for his generous cooperation in helping us to get the facts, and superintendent J. A. Yingling for his assistance at the plant.

This plant represents far-advanced operating practice. Special attention is called to some of the features that make it outstanding. They are:

1. **Safety features**
2. **Dust control with hydraulic collectors**
3. **Interlocking electrical controls throughout**
4. **Accurate blending to meet multiple specifications**
5. **Electrical controls for blending**
6. **Balanced production to minimize stockpiling**
7. **Electrical precipitators for control room**
8. **Design details to facilitate maintenance**
9. **Regulation of primary crusher output**
10. **Structural design**

THE EDITOR

Even the bins are completely covered over by steel plate, with manhole covers provided, to be opened only for inspection. Close-fitting skirt boards are used throughout on belt conveyors, and on the long belt conveyor carrying stone from the primary crusher to the secondary crushing plant, 12-in. skirt boards over the entire length safeguard against large pieces of stone falling.

Our own observation is that it would be difficult, indeed, for any reasonably alert employe to be injured.

Dust is considered a hazard to both men and machines, and the plant is equipped with the most highly developed and efficient system of dust control that we have observed in any crushed stone plant. The plant is spotlessly clean. Hydraulic dust collectors of 160,000 c.f.m. rated capacity collect the dust from every point of transfer of material throughout the entire plant. Ducts are run from all crusher chutes, crusher discharge points, transfers on to belt conveyors, feeders, from hoods over vibrating screens and from many other points that would be difficult of control had not the plant been designed for a thorough job of dust control.

With the plant operating at full capacity during a period that was among the dryest in Oklahoma's history, it was no problem for us to take photographs at any location inside the plant, so effective was dust removal.

Safety through improved visibility, worker comfort and reduction in maintenance of equipment were the objective of the dust collector installation. The plant is in sparsely settled country, far from possible sources of complaints because of dust and the

Stone is excavated from a dome-like peak of limestone; 9-in. holes are drilled for the entire face ranging from 100 to 212 ft. in height. Primary shots comprise 26 to 35 holes to bring down 150,000 to 250,000 tons per blast

dust recovered has no particular value except to "sweeten" the agricultural limestone in stockpiles.

Quarry

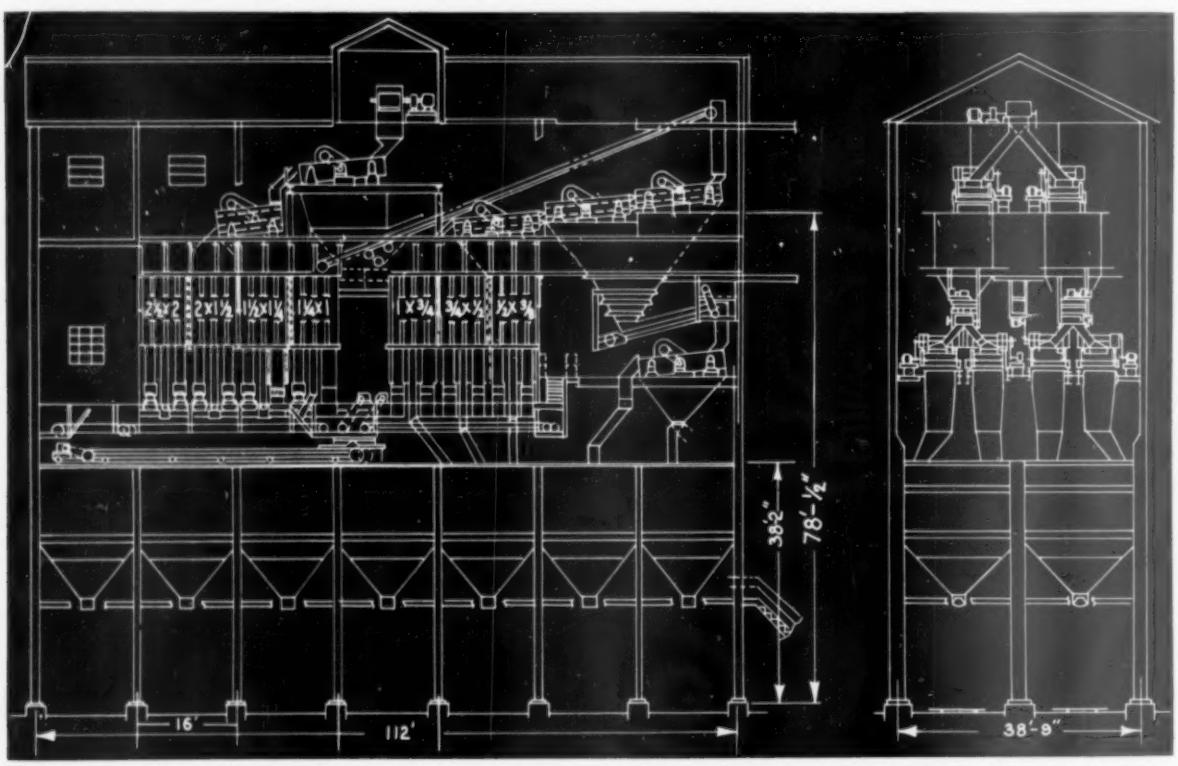
The plant is located on highway 277 just north of Lawton, Okla., and Fort Sill, where a dome-like peak of limestone under excavation is visible for miles around. Stone making up this dome is a hard, durable high-calcium limestone with an analysis of about 90 percent calcium carbonate equivalent. Its physical, mineralogical and chemical characteristics permit meeting any local, state or federal specifications. The formation is identified as the Arbuckle limestone and the dome is believed to have originated from earth upheaval. Much of the adjacent native rock is granite.

Stone is comparatively free from clay inclusions or seams and for all practical purposes has no overburden. The dome structure is made up of a series of limestone bands, or stratifications, of uniform character which vary from one to 20 ft. in thickness. The strike of these beds is north-south and they dip to the east at a pitch of 45 deg.

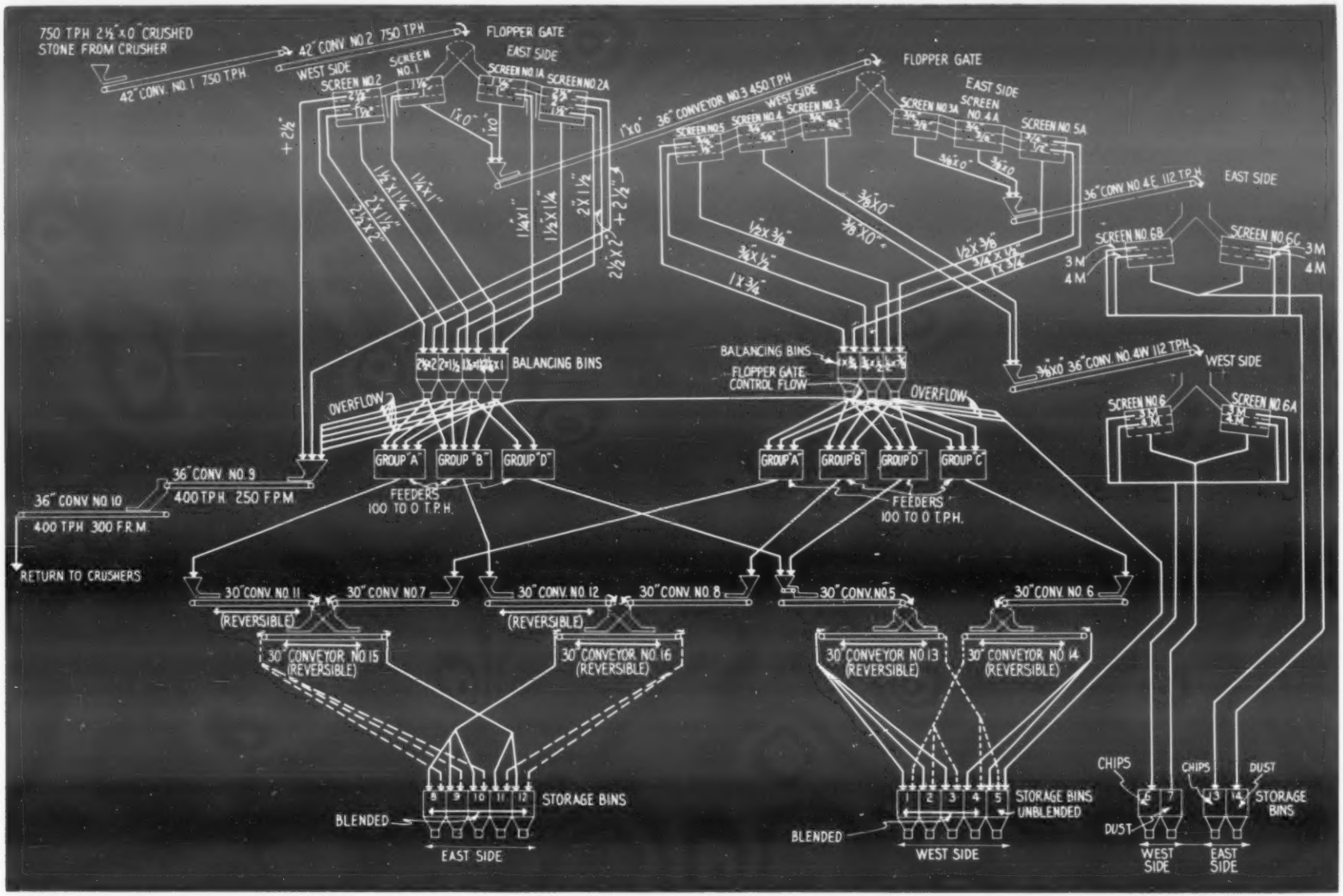
Early quarry operations were on the east face or toe of the dipping limestone beds. With development of a high face came excessive drilling and blasting costs and the danger of large blocks sliding down the pitched bedding planes, so the present face was opened from the south side. Thus, the face of the quarry is at right angles to the strike of the limestone. It has been opened for a length of about 1000 ft. and the face varies from about 100 ft. in height to a maximum of 212 ft.

Blast holes are drilled the entire height of the face, through the sloping strata, to a level 5 ft. below the quarry floor, in order to concentrate a heavy load of powder and obtain a clean break at the floor. Two 29-T Bucyrus-Erie electric blast hole drills sink 9-in. holes at the rate of about five feet per hour, and the primary blasts are generally large. Primary shots comprise from 26 to 35 holes to bring down from 150,000 to 250,000 tons of stone per blast. These blasts are made at 60- to 90-day intervals.

Pattern of drilling varies slightly according to the height of face. A single row of holes is shot per blast. Where the face is in excess of 150 ft., the burden is 30 ft. and the spacing is 40 ft. Spacing is reduced a few



Elevation of screening and blending plant. Basic sizes are screened overhead into seven balancing bins holding the sizes indicated. Minus ⅜-in. fractions are divided over screens on right. Below the balancing bins may be seen the blending feeders, gathering belt conveyors and shuttle belt conveyors, which deliver blended products into bins below. There are two rows of seven finished product bins holding 250 tons each



Flow sheet of screening and blending plant designed to produce 750 t.p.h. of finished product. Seven basic sizes are produced and stored in separate balancing bins, to be drawn from in various combinations to meet size specifications

Stone being loaded into heavy-duty truck in quarry. The haul to primary crusher is over level floor to a ramp leading up to crusher feeder

When weather conditions indicate the desirability, minus 2-in. stone through the grizzly preceding the primary crusher is screened and the minus ¾ in. (⅜-in. screen) is stockpiled over stacker conveyor on right. There is a tailpulley drive on conveyor. Conveyor on left transfers stone from vibrating screen on to the stacker conveyor

feet for lower faces but the burden is held at 30 ft.

Holes are charged with Du Pont Nitramon and the loading for a typical high-face hole of 200 ft. is as follows: The charge (two cans) is placed in the bottom of each hole with the bottom primer, and each such bottom primer is connected to the shorter of two parallel Primacord trunk lines on top of the face so that detonation starts from the bottom of each hole. A second primer is located half-way up the hole and a third is 16 ft. from the top of the hole. These two primers, for each hole, are wired to the second primacord trunk line. Each hole is stemmed with screenings for the top 16 ft. Short interval delay blasting is accomplished through the use of Du Pont Primacord MS connectors spliced to the two trunk lines between holes. Detonation is by cap and fuse connected across the ends of the parallel trunk lines, thus completing the circuit for split-second delay shooting of holes in sequence.

Results from bottom detonation and split-second delay blasting have been excellent. Du Pont technical representatives have been very helpful in working out this system of primary blasting. Whereas, previously secondary jackhammer drilling was a continuing operation requiring seven or eight men, secondary drilling is no longer required. It requires about 30 min. per day, using a crane and 6000-lb. Cape Ann octagonal drop ball to break up oversize stone blocks. An occasional mud-cap is required.

Some rip-rap is still produced from the east face of the dome to supplement that obtained from the south face, using just enough blasting to cause the stone to slide down the 45 deg. slope. The blocky nature of some of the beds lends itself particularly well to the production of both rip-rap and jetty stone. Loading of this large stone is accomplished by a crane mounted on the chassis of a heavy truck.

Excavation of quarry-run stone is by two Bucyrus-Erie, 120-B electric shovels with 4-cu. yd. buckets. A No. 80 Northwest butane-powered shovel with 2¼-cu. yd. bucket is also available for loading. Haulage to the primary crusher is by nine end-dump Euclid trucks carrying 18 tons to the load. They are powered by 200-hp. Cummins and GMC diesel engines. Haul to the primary crusher is about 1000 ft., with a smooth, wide roadway up the ramp to the crusher—permitting easy turn-around for dumping.

Primary Crushing

Since the overall design of the plant is dependent on balancing the shipments from the finished stone bins, the primary crusher is fed at a controlled rate according to the requirements of the screening and blending plant. Accordingly, the primary crusher is fed by a variable speed apron feeder, and its output may thus be readily changed.

Trucks dump to an 8- x 31-ft. extra heavy-duty Worthington apron feeder. This is a horizontal feeder which is kept uniformly loaded over its entire length to withstand shock of the dropping stone. It holds about a carload of stone at any time. The drive on it is a 55-hp. wound rotor motor through flat belt which permits 11 variations of speed of the feeder. The operator need only make the necessary adjustments by drum controller to reduce or increase the grid resistance according to the speed desired. Top speed of the motor is 1200 r.p.m.

Discharge from the feeder is over an inclined heavy-bar grizzly, with manganese steel buildup on the top

Left: One of the quarry trucks dumping stone to primary crusher pan feeder. Building in background is screening and blending plant. Right: Close-up of pan convyor which regulates rate of feed to crusher

surface to take the shock. Spacing of the rails is 2 in., to by-pass small stone around the primary crusher.

The crusher is a 42-in. Traylor Bulldog gyratory, driven by a 275-hp. motor, which is set to deliver a minus 8-in. product for direct delivery over a 42-in. belt conveyor into the secondary crushing plant.

Possibly 40 percent of the total stone by-passes the primary crusher through the grizzly. This fraction is carried to a scalping screen by a 36-in. belt conveyor. Purpose of this screen is to make a separation at ⅞ in. when quarry conditions and weather make it advisable to remove fines, and it is only operated as a rule during and after wet weather periods. Otherwise it is by-passed and the stream diverted back to the 42-in. primary belt conveyor, over a 36-in. cross belt conveyor.

The screen is a 6- x 12-ft. type F-800 Ty-Rock double-deck vibrating screen with 1¾- and ⅞-in. square openings on the top and bottom decks, respectively. The top deck serves to relieve the load on the bottom deck as well as to reduce wear. When in operation, approximately half of the feed to the screen is minus ⅞-in. stone, or 20 percent of the total is screened out and stockpiled over a 30-in., 350-ft. centers, stacking belt conveyor. The conveyor is driven from its tail pulley and the stone is discharged to stockpile from the end through a 16-in. diameter sleeve. A water spray is applied in the top of this sleeve to alleviate dust. Water is applied through action of a limit switch which is tripped as the discharging stone strikes a paddle, to start and stop the motor drive on a well pump. There is a heavy demand for this road stone product.

The primary crusher operator throws a lever to by-pass or put the 2-in. minus stone over the scalping screen. His station is an elevated platform where he has all his controls and signals handy and from which he can see into the crusher opening, the entire length of the apron feeder and the trucks as they dump. Signal lights keep him informed of the plant requirements ahead and he adjusts the output of the primary crusher according to demands of the screening and blending plant. The crusher can produce as high a 1000 t.p.h. or even more but is held at a considerably lower rate proportionate to sizes desired in the screening and blending plant.

As protection against stone chips flying out of the primary crusher, the entire half of the crusher opening opposite the feed side is covered by steel plate and a duct has been run through for dust collection. A chain is strung across in front of the crusher as further protection, to prevent anyone coming too close. A 40-ton Yale and Towne hoist is hung from an overhead A-frame for use in handling heavy crusher parts. A Curtis pneumatic hoist with hook is provided for handling any hang-ups in the crusher.

Primary gyratory crusher is entirely covered over except on grizzly side. Note chain for added protection of workers and dust collector duct on left. Operator has an overhead station

Secondary Crushing

Minus 8-in. stone is conveyed by the 42-in. primary belt conveyor to the head of the secondary crusher building. This is the conveyor with 12-in. skirt boards for its entire length to guard against large pieces of stone starting to roll and fall. Skirt boards are of steel plate and elevator belting. Drive for the conveyor is a 100-hp. squirrel-cage motor through a W. A. Jones speed reducer and Twin Disc fluid drive. This type of drive was selected to facilitate bringing the belt to full speed when under load. When under full load, the slippage is about 1 percent, and maximum capacity can be as high as 1100 t.p.h.

Stone is first screened over a 6- x 12-ft. F-800 TyRock double-deck vibrating screen mounted over three bins arranged in a row. The screen carries 4-in. square openings on the top deck and makes a separation at 2½ in. on the bottom deck, its purpose being to divide the load between the secondary crushers and send the minus 2½-in. material, by belt conveyor, to the head of the screening and blending plant.

The three bins hold 220 tons each and the main belt conveyor delivering to the screening and blending plant starts beneath the bins. Plus 4-in. stone is screened into the bin at the far end, and the intermediate product (2½-4 in.) into the middle bin. Minus 2½-in. stone is chuted direct to the belt conveyor for delivery to the screening and blending plant. The third bin, which is nearest the point of incline of the main belt conveyor, is for returns for recrushing from the screening and blending plant and for flow-over from the middle bin.

Primary crusher is fed by heavy duty pan conveyor which is followed by rail grizzly. Note operator's station from which he observes truck dumping operation, feeder and primary crusher

Arrangement of the secondary crushers is rather unique, and their sizes and settings are the starting point for control of the gradation of finished products and the balancing of sizes. Plus 4-in. stone is fed into a 5½-ft. Symons standard cone crusher at the far end of the row of bins. Feed is over a horizontal belt conveyor driven through a 7½-hp. Sterling vari-speed motor. Rate of feed is regulated by simply turning a handle to the desired belt speed. Discharge of stone is on to the main belt. On either side of the second bin (2½-4-in. stone) is a 4-ft. Symons standard cone crusher. A third 4-ft. standard cone is on one side of the third bin (recrushing), with a 4-ft. shorthead cone crusher on the opposite side. Feed into these four crushers is by gravity through inclined chutes. Each crusher feed chute has a solenoid trip to cut off the feed automati-

Screen for scalping out small stone for stockpiling when weather conditions make it desirable. Note piping to dust collector

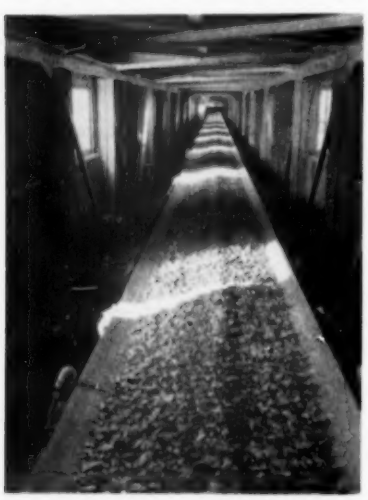
cally as part of the electrically interlocked system which we describe later herein.

All crushers are mounted on high reinforced concrete foundations so designed that it is easy for maintenance men to service them below. Cross conveyors deliver the discharges from the four crushers onto the main belt.

Each crusher has a different setting to yield the combination of sizes to be screened into balancing bins from which the final products are later blended. Sieve tests on the product from each crusher are run as needed and recorded on test sheets as a guide to re-setting and, incidentally, as a check on the wear condition of the crushing surfaces. If the emphasis be on finished sizes below ¾ in., for example, as contrasted to sizes between 1 in. and 2 in., the crusher settings are adjusted for the optimum results.

As we describe later, plus 2½-in. stone from the screening and blending plant, along with excesses larger than 1 in., are returned into the bin serving the 4-ft. short head and a 4-ft. standard cone crusher. Blending operations are controlled to hold these excesses to a minimum. The return, for recrushing, is over a 36-in. belt conveyor with a rated capacity of 400 t.p.h. A 15 percent return over this conveyor (No. 10 on accompanying flowsheet), when blending all stone out of the balancing bins, is the objective for best performance as measured by balancing of output and the production of fines. While the belt conveyor could return up to 50 percent of total stone for recrushing, in the event of unusual conditions, a low percentage of returns is the goal. A single pass, of course, holds down the production of fines and it is the ⅜-in. minus material that is produced in excess and which must be stockpiled.

The bins over the secondary crushers are designed with the partition wall lower between the two from which the 4-ft. cone crushers are fed. Thus, excesses building up in either of the two bins will flow over into the other so that crushing capacity of that product, whether it be 2½- to 4-in. stone or plus 1-in. returns, is roughly doubled until a balance is attained. A set of Yale and Towne 10-ton capacity triplex chain blocks is mounted overhead for handling heavy crusher parts.



View of 42-in. conveyor No. 1 feeding main building at the rate of 750 t.p.h.

Screening

The final screening and blending plant is entirely new and is unusual principally in its control features for meeting gradation specifications. It is a dual arrangement of screens and conveyors so that the plant can be in full operation, or either the west or east side might be run separately in the event of major breakdowns or repairs or should market demands not require full capacity. Total screening surface is large for sizes under 1-in. in view of the increasing demands for the smaller sizes and in anticipation of further trends in that direction. Also, from the point of view of accurate blending of the final products it is desirable to have closely sized products screened into the balancing bins from which the final blends are made. All vibrating screens are Robins Eliptex and there are 14, of which two are 5- x 10½-ft. triple-deck screens. The balance are 5- x 14-ft. double-deck screens.

These screens are elliptical throw and operate on a comparatively flat gradient of 5 percent. Each bank of screens operates as a series of two or three and all of them have hoods for the collection of dust. The lower end of each bank of screens is at about waist height and they are in large rooms with generous aisle space on both sides and ends. The floor level is raised, by steps, at the higher ends of the screens to make it easy to perform maintenance and repair at any point, and to facilitate changing screen cloth.

A 42-in. belt conveyor (No. 1) delivers stone from the secondary crushing plant to the head of the screening plant where a transfer is made to a second 42-in. belt conveyor (No. 2) delivering to the top screens. These conveyors are rated at 750 t.p.h. The No. 1 conveyor is on 349-ft. centers and has a pitch of 19 deg. for a rise of 84 ft. It is driven at 276 f.p.m. by a 150-hp. motor through a Jones herringbone speed reducer. The discharge box has a flop gate arrangement by which the entire conveyor stream, at reduced capacity, could be diverted to the screens in either side of the plant. As shown on the accompanying flowsheet, screening equipment is in duplicate for the east and west sides of the plant. Screens on the west side are identified by numbers for the purpose of following the flow and those on the east side carry the corresponding numbers with the letter "A" added.

Belt conveyor carrying primary crusher output to secondary crushing plant. Note skirtboards for entire length

With the entire plant in normal operation, the stream of stone is divided equally over the two parallel rows of double-deck vibrating screens (Nos. 1 and 1A), carrying 1¼- and 1-in. square screen openings on the top and bottom decks, respectively. The two rows have two screens in series. A separation is made at 1 in. over these two screens and the minus 1-in. stone is carried by an inclined 36-in. belt conveyor (No. 3), rated at 450 t.p.h., to a separate series of screens for fine sizing. One size of stone, a 1¼- x 1-in. size, is taken off the No. 1 and No. 1A screens and chuted into one of four 60-ton balancing bins below. Plus 1½-in. stone from each of these screens is screened over a 5- x 10½-ft. three-deck screen (two) with 2½-, 2- and 1½-in. screen deck openings, respectively. Three sizes are taken off into separate balancing bins, a 1½ x 1¼ in., 2 x 1½ in. and a 2½ x 2 in. Thus there are four sizes screened and chuted separately into four adjoining balance bins. Plus 2½-in. stone from screens 2 and 2 A is chuted to a 36-in. belt conveyor (No. 9) for transfer to the previously mentioned No. 10 conveyor which delivers the stone back to the secondary crusher building. No. 10 conveyor is on 240-ft. centers, is 36 in. in width, and is driven at 300 f.p.m. by a 25-hp. motor with herringbone speed reducer. Its peak capacity is 400 t.p.h. Any excesses of the four sizes going into the bins may similarly be returned over the same belts for further crushing, but that is not normal operation. In the event an unbalance in operation occurs for any reason, an excess of any size of stone overflows through an internal overflow pipe within each balancing bin which discharges on the belt conveyor.

The minus 1-in. stream is conveyed to an end of the plant where the sizing screens are located over three adjoining balancing bins. Through a flop gate, the feed is split between two rows of three double-deck screens each, designated as 3 and 3A, and 4 and 4A, and 5 and 5A. The top deck of the first two screens in each row carries ¾-in. square openings and the bottom decks are ⅜-in. These two screens in each row function as one in order to have sufficient screening surface for a complete separation of the fines. Minus ⅜-in. material is screened out for further separation of agstone from chip sizes over other screens, and three sizes are taken off the No. 5 and 5A screens. These screens carry ¾- and ½-in. screen openings, top and bottom respectively, yielding 1- x ¾-, ¾- x ½-, and ½- x ⅜-in. products which are dropped into the separate balancing bins. Thus the balancing bins have seven separate products which are sized within close limits. Overflows from the balancing bins holding minus ¾-in., through plus ⅜-in. sizes, which

Two of the secondary crushers are shown. Note they are on elevated bases and hand rails are provided for safety. Solenoid trip for automatic feed cut-off may be seen above feed chutes

are not economical to recrush, are diverted into one bin. This mixture, called "unblended ¾-in. stone", is the only plus ⅜-in. unblended material produced through the Richards Spur screening and blending plant. To the extent sales of this material do not equal its unavoidable production, it must be stockpiled.

Minus ⅜-in. stone from vibrating screens Nos. 3 and 4 is dropped into a 100-ton hopper from which it is conveyed by a 36-in. belt conveyor (112 t.p.h.) and divided over two vibrating screens designated as No. 6 and No. 6A. Similarly, the minus ⅜-in. from vibrating screens 3A and 4A is divided over vibrating screens 6B and 6C. The four screens carry 3-mesh and 4-mesh on the top and bottom decks for separation of chip sizes from the fines.

The two sizes of chips from each pair of screens are recombined and chuted into separate finished product bins (Nos. 6 and 13). Similarly, the fines are recombined and sent to bins No. 7 and No. 14. Both of these products are stockpiled by truck as required.

Close-up of solenoid trip which cuts off feed automatically to one of secondary crushers as part of electrically interlocked system

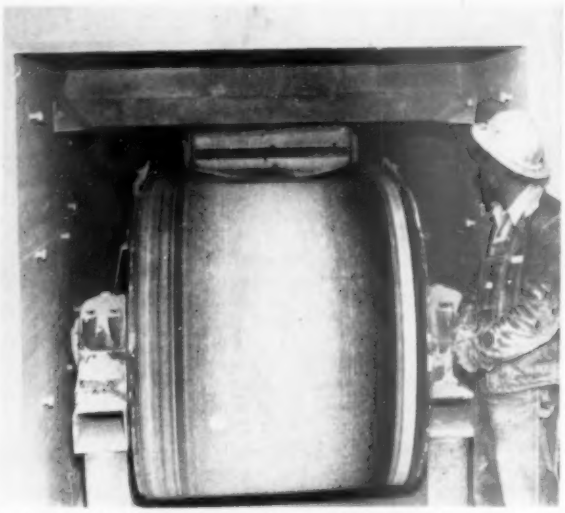
Total storage of finished products is in 14 steel bins holding 250 tons each of which four are set aside for chips and fines and a fifth for unblended ¾- x ⅜-in. stone. They are in two parallel rows of seven, numbered from 1 to 7 on the east side and 8 to 14 on the west side.

Blending

Blending is accomplished through a series of Robins horizontal belt-type feeders underneath the balancing bins. There are 22 of these feeders under the bins as follows:

No. of Feeders	Size of Product
2	2½ x 2 in.
2	2 x 1½ in.
3	1½ x 1¼ in.
3	1¼ x 1 in.
4	1 x ¾ in.
4	¾ x ½ in.
4	½ x ⅜ in.
22	

The feeders from any bank, or group, discharge onto horizontal 30-in. gathering belt conveyors which in turn discharge to a second horizontal, reversible, shuttle-type 30-in. belt conveyor which delivers the finished blended products into selected storage bins. There are four 30-in. hand-propelled rail-mounted shuttle conveyors as shown on the flowsheet which provides a very flexible method of feeding the various storage bins. There are six 30-in. gathering belt conveyors. Four of these transfer to a pair of reversible shuttle belt conveyors serving five bins, as shown. The other two transfer separately to another pair of reversible shuttle belt conveyors serving four bins. The shuttle belt conveyors enable filling any or all of the blended stone bins served by them via the same gathering, or blending, belt conveyor. Also, by feed-



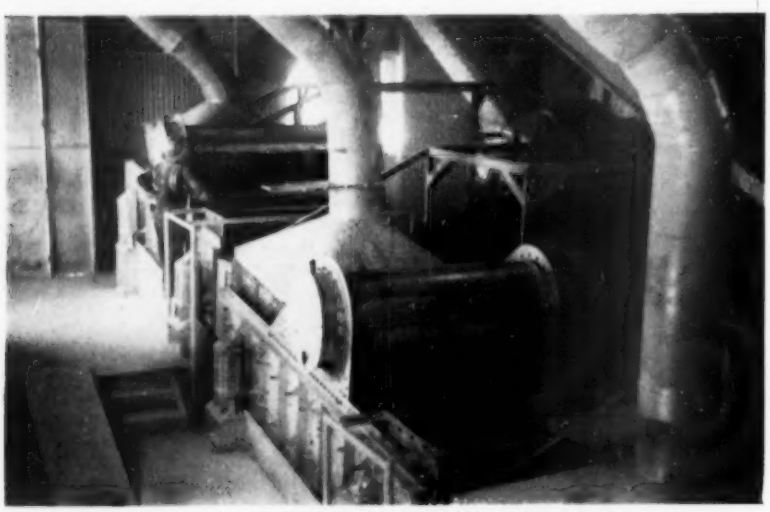
Left: Head of this conveyor illustrates how enclosures are provided as part of dust collection system. Right: Shows how provision is made to prevent roll-off at end of belt conveyor

ing the blended stone over separate belt systems intermixing can be made to take place at the transfer points.

An original device to minimize segregation in the bins was made and installed by Dolese Bros. Co. at the discharge ends of the shuttle belt conveyors. This device resembles a simple, 4-pocket water-wheel and is mounted on a horizontal shaft that can turn. Stone coming off the belt impinges on one of the pockets, or paddles, causing the device to revolve, slowing down the velocity and breaking the trajectory of the falling stone. This causes an intermixing action at the point of fall that aids in minimizing segregation. The paddle-wheel with its quadrants is about the width of the belt.

The 22 belt feeders and their drivers are an entirely new development and extremely interesting in their design and operation. It will be noted on the accompanying plant layout that they are arranged so that blends are made in two banks of seven, one of five and one of three. Thus, regulated combinations of stone from seven sizes may be incorporated into a finished blend, while another product is being blended in a different combination from the seven bins, a third product is being blended from five sizes and a fourth from three stone sizes. Provision has been made so that additional balancing bins and blending belts might later be installed for including stone of sizes larger than 2½ in. in blends and, also, for incorporation of fines into blends of the smaller sizes which now are being produced according to specifications by careful combination of sizes above ⅜ in.

It will be noted from the plant drawing that the separate banks of feeder belts are arranged in parallel rows in order to feed simultaneously onto a common blending, or gathering, belt conveyor.



Showing 5 x 14-ft. vibrating screens with dust collector hoods

Blending Feeders

The feeders are unitized pieces of equipment developed for this plant and have been made into a standard line by the manufacturer. They measure 4 ft. 6 in. on centers, are 24 in. wide and have a capacity range from 0 to 100 t.p.h. All mechanical parts are inside the endless belt, to facilitate replacement of an entire unit for maintenance or repair. If that be necessary, 16 bolts are removed and it is simple to slide out the assembly and insert another assembly as a unit.

At each feeder, there is a feeder chute with ratchet gate for manual cut-off, and there is a fixed but adjustable gate to maintain a bed of 8 in. on the belt. Feeler bars, or fingers, ride on the bed as an automatic control to insure a constant depth of feed on the belt. Should the bed drop below 8 in. in depth, these feeler bars actuate a switch that will kill the entire bank from which a blend is being produced. This is one of many guarantees against producing off-specification stone.

Each feeder is driven by a 3-hp. G.E. gearmotor which has a maximum speed of 25 r.p.m. and a 48:1 infinitely variable speed range. The drives have constant torque regardless of speed. Control of speed is by G.E. type V3B speed variator power units. Each drive unit has a tachometer generator on the extension of the shaft at the high-speed side of the motor for interconnection to stepless, wire-wound control rheostats on the control room panel board.

The central control room is located on the blending belt floor level at one end of the building, and is the key to the entire operation. This room is

tightly sealed and under slight pressure to keep out dust. Air circulating in the room is filtered through an electronic precipitator of high efficiency which keeps out dust particles even down in the micron size range, and provides conditioned air as well, according to temperature needs. The entire front of the room is of plate glass so that the operator has a clear view of the blending equipment.

The central control room, with its switchboards and operating panelboards, has more refinements than any we have seen operate in the entire aggregates industries. Yet, as far as its practical functions are concerned it is relatively simple to operate and foolproof. One man is stationed in this room and it is his responsibility to start the plant and to be alert to unexpected developments which require quick action. He has before him panelboards that tell at a glance the entire story, in lights, as to operation of every piece of driven equipment and, whether the separate balancing and finished product bins are nearly full or empty.

View showing takeup end of some of the 24-in. feeder conveyors

Screening Plant Controls

Switches and indicating lights for the entire screening plant, covering the operation of primary belt conveyor No. 1 from the secondary crushing plant right on to filling the balancing bins are centralized on a bench board which controls all flow functions independent of blending. When production is to begin, the men at the secondary crusher station and the primary crusher signal that they are at attention and ready to start. A pair of lights for each of these stations accordingly lights up on the bench panel board in the control room. Having received instructions that the plant is to be set into full production or that either the east or west side is to be operated alone, the operator sets, accordingly, the flopper gates controlling the feed to the two parallel banks of screens. A pair of these lights for the selected condition shows up on the board, as actuated by the flopper gates. Incidentally, a pair of lights for each function is provided rather than one, in the event a bulb should burn out. A single light, thus, would be as good as two for indicating that operations are set up as desired.

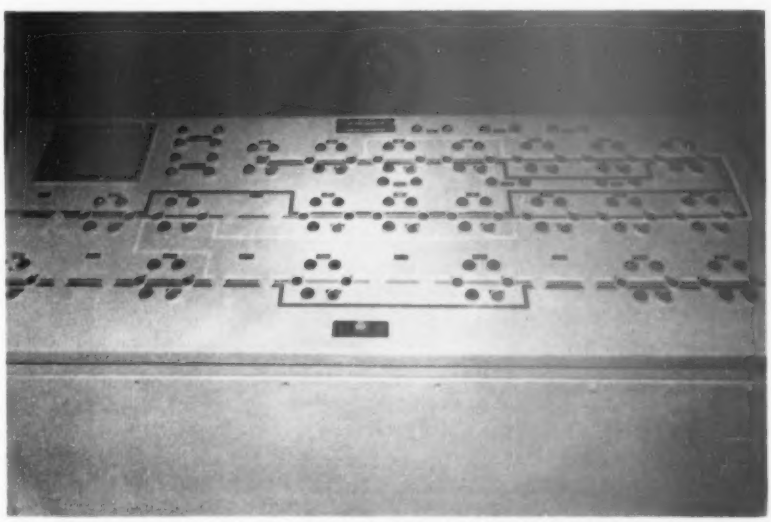
As a safety feature, the plan of operations, whether full load or at half capacity, is called out over a loudspeaker telephone before any switch buttons are pressed. On the bench board panel, green, black and yellow lines make it simple to start the various equipment in sequence. One color is for the switch buttons for the west half of the plant only, a second is for the east half and the third line, in the middle, interconnects the switch buttons for full plant production.

The operator starts the sequence by first pushing the button for the return belt conveyor (No. 10) to the secondary crushing plant. He follows along the line, pressing successively only those buttons encountered along the line corresponding to the operation to be started. All buttons are in reverse sequence from No. 10 belt conveyor back to No. 1 conveyor. No equipment can be started unless the light for the equipment ahead is on.

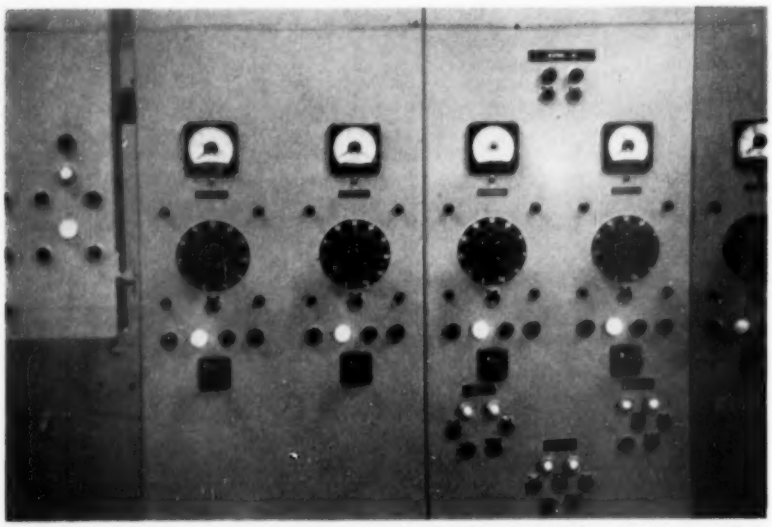
When all equipment is running back to No. 1 conveyor, and all indicating lights are on accordingly, the operator then presses a final button which allows starting of the No. 1 belt conveyor which brings stone up from the secondary crushing plant.

Lights indicate this belt to be running at the secondary crushing plant control station and the operator at that station starts his equipment, which is also interlocked back to the primary crushing station. The last step here is to start the 42-in. belt conveyor from the primary crusher which is the signal for the crusher to be started. Operation of these stations then is shown in lights on the bench panel in the central control room.

The operator in the central control room telephones instructions to the primary crusher operator when it is necessary to speed up or reduce the crusher output. He also has at his disposal an emergency push-button by which he can stop the entire plant. This might be necessary if overflows from the balancing bins returning to the secondary crushers become exces-



All operations up to blending are started on table board. Vertical panel has controls for blending operations



Close-up of part of vertical panel in control room showing rheostat dials for setting tonnage flow

sive and indicate a serious condition in need of quick attention, or in event of accident or other abnormal condition.

When the final button to start belt conveyor No. 1 is pressed on the table panel, the primary control circuit to the feeders and related conveyors for blending is activated. When this condition is reached, the operator switches his attention to the vertical panel board controlling the blending operations.

Blending Controls

The panel board controls the blending operations and encompasses all signals for plant condition as to quantity of stone in balance and available for loading. At each balancing bin there is a light indicating system showing red, green or amber from top to bottom and there is a reset button. Each of the 14 finished product bins has light indicators also showing red, green or amber from top to bottom which are a guide to the bin condition for the carloader.

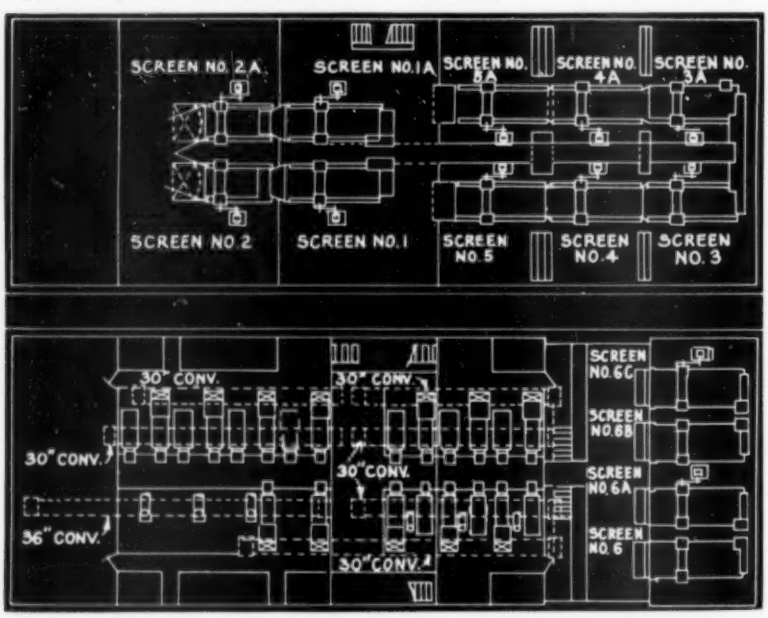
These lights are actuated by touch plates and may later be replaced by probes at different levels in each bin to perform the same function. A red light indicates a bin to be approaching full but there is about a 5-min. time lag before the bin would be completely full. A green light indicates a normal floating load in a bin or that it is at about half level. An amber light is the signal to stop loading cars or trucks because a bin is nearly empty. There is also a time lag of a few minutes here before a bin is completely empty.

Duplicate lights for each bin show exactly the same condition on the blending panel board in the central control room. Adjoining panels are for the two banks of seven feeders, which blend all or any part of all seven basic sizes from the balancing bins, the bank of five for middling and fine sizes, and the bank of three for fine sizes. By having four separate banks, four different specifications may be met simultaneously through blending; however, most of the time two banks are intended to be used on the same blend to fill major tonnage orders.

Rheostat controls for the individual blending feeders are hand-adjusted dials on the board panels. They are calibrated from 0 up to 25, each unit of the scale corresponding to 4 t.p.h. After the primary circuit to this board is energized, the several feeders involved for a given blend are set by moving a hand to the desired scale reading. When all is set, and after a 15 min. warm-up period for the feeder drives, and the shuttle and gathering belt conveyors have been started in sequence, a master button is pressed to start a selected bank of feeders instantaneously. Each dial has a red hand which indicates the proper rate of feed. Each dial also has a black hand which should coincide with the red hand if the rate of feed is exactly correct. This black hand is adjustable by hand rheostat to keep it constant with the red hand.

Should a balancing bin run empty, the entire bank of feeders involved will automatically cut off. If the overflow for return to the secondary crushers be too great, that might be cause for a complete shutdown for readjustment of the crusher settings. If the red light comes on for any final product bin, a siren warning sounds on the shuttle belt floor level and in the control room. The operator glances at his clock knowing that in 5 min. the bin might fill completely and jam stone up to the conveyors. During the interval, the man on the shuttle belt floor is called to action. When he shuts off the siren, the operator knows that he is on the job, and contact is maintained between these two men by the combination loud speaker and telephone system until the danger is past.

Rather than shut off the bank, usual practice is to move the shuttle belt to an adjoining opening to spread the bin load until draw-off from below will clear the condition. A 60-ton carload of stone can be loaded in just two minutes so a bin could be half-emptied in the five minute cushion period.



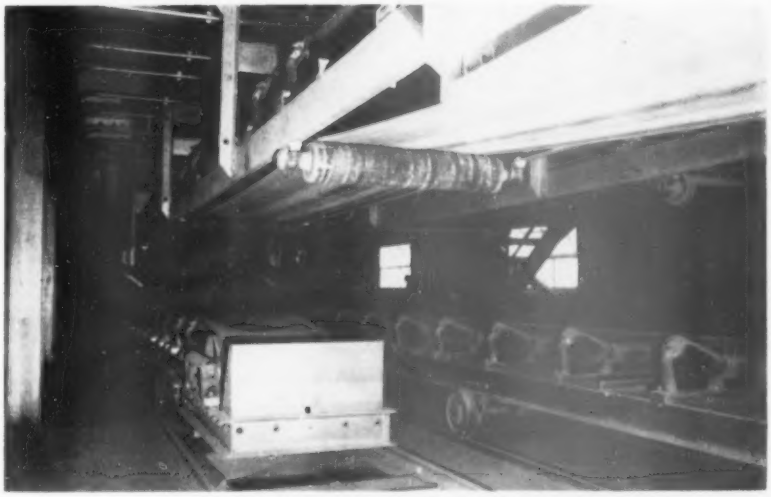
Upper plan view shows vibrating screens for sizing stone into seven basic sizes in the range from 2½ to ⅜ in. Plan view, below, at blending level shows blending belt feeders and vibrating screens (right) for sizing fractions smaller than ⅜ in.

Loading

Another innovation to help keep production in balance, is a scoreboard for the car dispatchers which is mounted on the high-level end of the plant and is equipped with railroad-type signal lights to show the quantity of crushed stone in each of the 14 loading bins. A red light indicates a full bin or nearly full, a green light indicates a bin in the safe operating range, and an amber light indicates a bin that is empty or very nearly so. These lights are duplicated in color and meaning by lights at each loading bin, at the loading station, and by corresponding ones on the control room panel board.

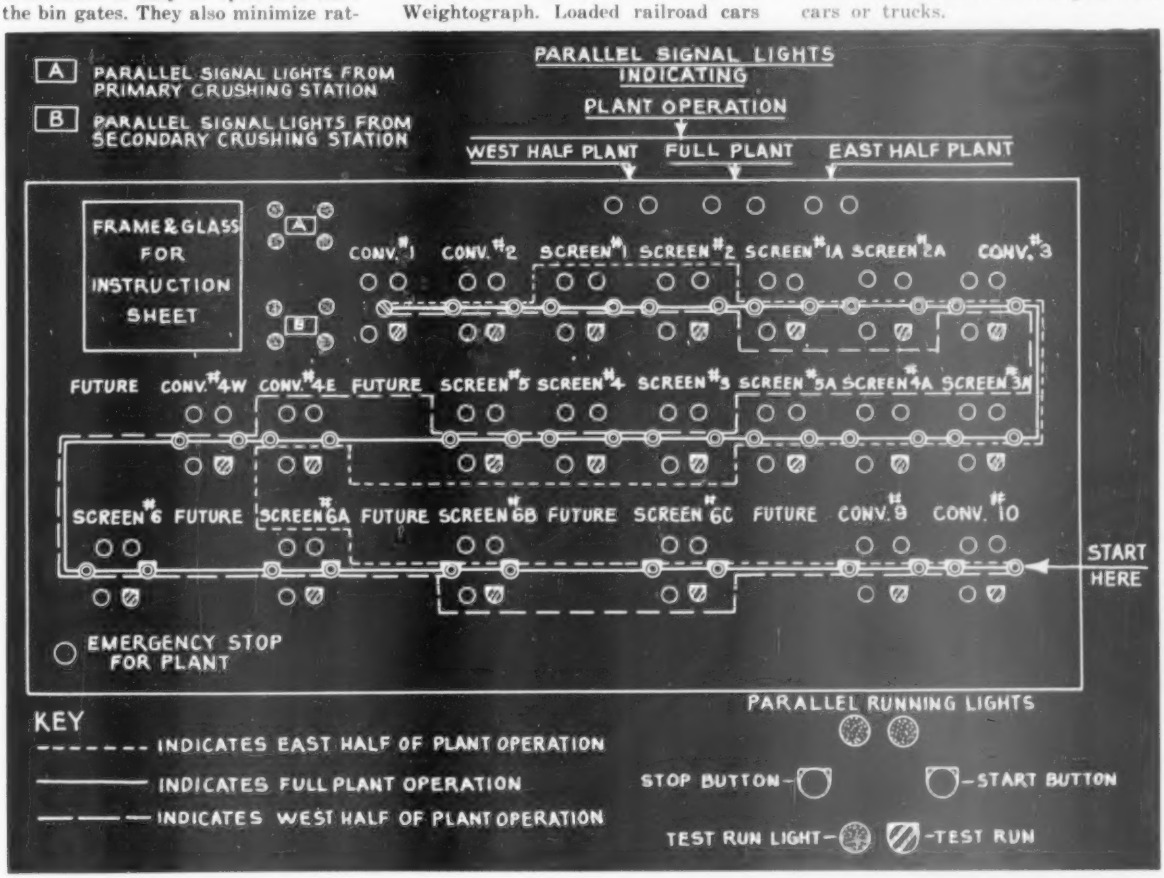
Empty railroad cars are stored about 1000 ft. from the plant and are dropped down the 5 percent grade and spotted on the proper track according to the bin conditions and needs as indicated by the lights.

Six cars can be loaded simultaneously, if necessary, through clamshell-type gates which are lever-operated. It is of interest that each bin has an horizontal baffle plate just above the opening which supports the main weight of the column of stone and makes it easy to open and close the bin gates. They also minimize rat-holing and segregation as material is drawn. All bins and chutes are lined with ¾-in. abrasion-resisting steel plate.

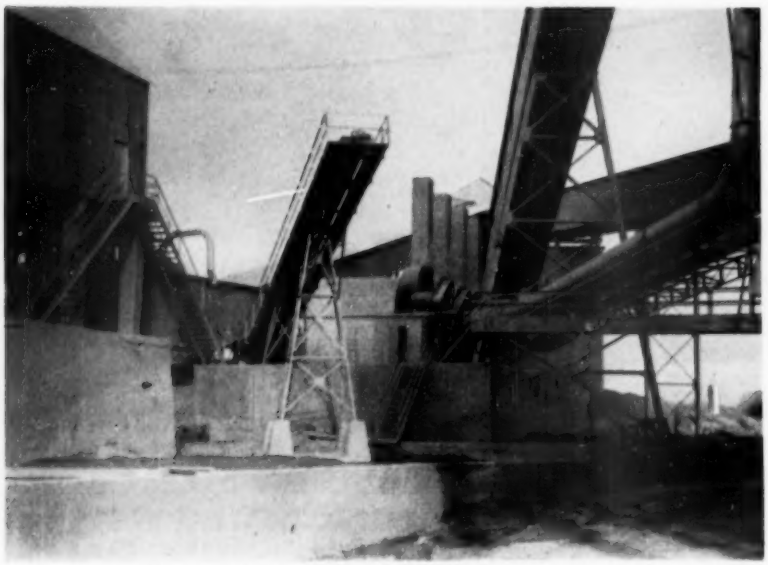


A view of 30-in. shuttle conveyors feeding finished products into main bins

Shipments also are made in trucks. Trucks are weighed and the weights recorded on a Fairbanks Morse Weightograph. Loaded railroad cars are dropped below the plant and are weighed on track scales of the Rock Island railroad. A 23-ton General Electric diesel-electric switch engine is in service. Stockpiling is done by trucks as needed, and a crane with clamshell reloads from stockpiles into cars or trucks.


A PARALLEL SIGNAL LIGHTS FROM PRIMARY CRUSHING STATION
B PARALLEL SIGNAL LIGHTS FROM SECONDARY CRUSHING STATION
PARALLEL SIGNAL LIGHTS INDICATING PLANT OPERATION
WEST HALF PLANT
FULL PLANT
EAST HALF PLANT
FRAME & GLASS FOR INSTRUCTION SHEET
CONV. #1 CONV. #2 SCREEN #1 SCREEN #2 SCREEN #1A SCREEN #2A CONV. #3
FUTURE CONV. #4W CONV. #4E FUTURE SCREEN #5 SCREEN #4 SCREEN #3 SCREEN #5A SCREEN #4A SCREEN #3A
SCREEN #6 FUTURE SCREEN #6A FUTURE SCREEN #6B FUTURE SCREEN #6C FUTURE CONV. #9 CONV. #10
START HERE
EMERGENCY STOP FOR PLANT
KEY
INDICATES EAST HALF OF PLANT OPERATION
INDICATES FULL PLANT OPERATION
INDICATES WEST HALF OF PLANT OPERATION
PARALLEL RUNNING LIGHTS
STOP BUTTON
START BUTTON
TEST RUN LIGHT
TEST RUN

Schematic drawing of benchboard control panel for operation of screening plant. All equipment is electrically interlocked. Starting sequence is from conveyor No. 10 back to conveyor No. 1, as fully described in article. Blending operations are controlled through a separate vertical panel board



Showing settling basins serving four hydraulic dust collectors

Electrical Safeguards

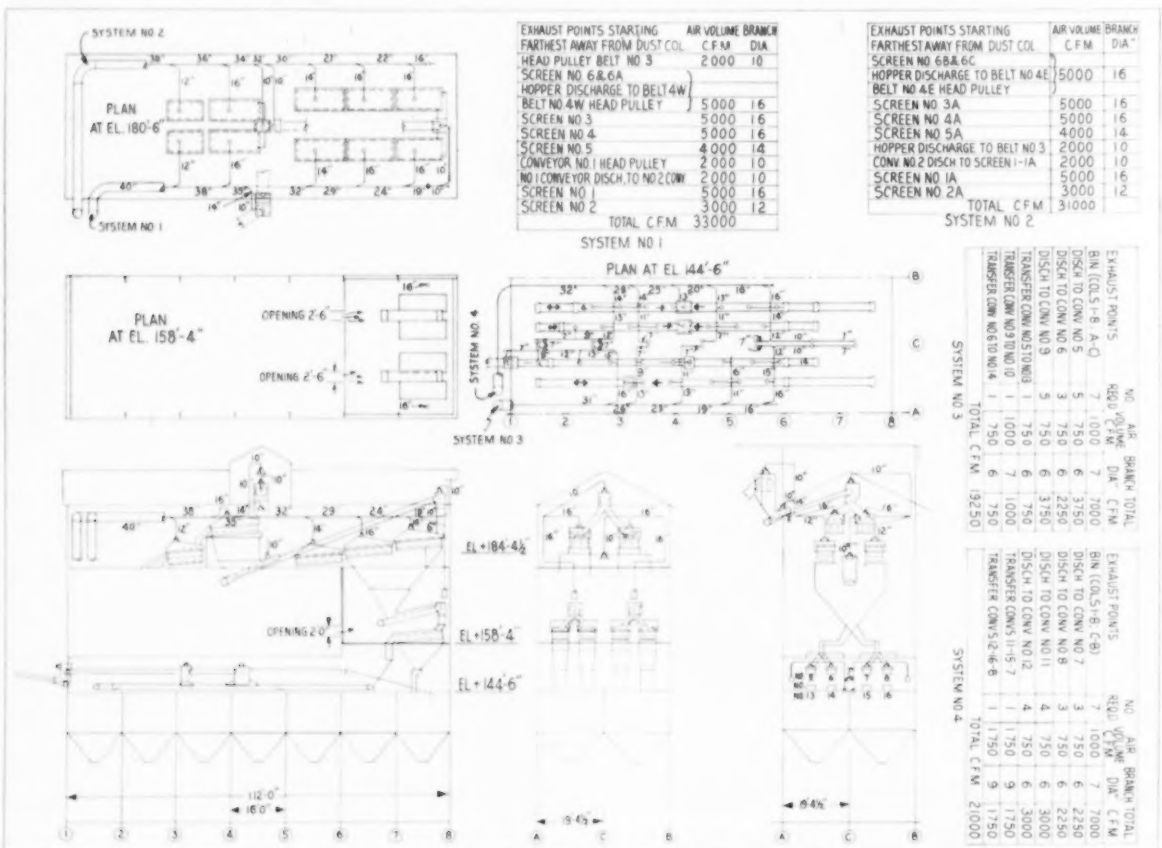
The controls described have contributed to effective utilization of manpower, the requirement being unusually low for a plant of such high capacity. From the standpoint of safety and protection of equipment, it also has definite advantages.

Should any driven piece of equipment need to be down for repair, the drive in question is locked out at the motor switch and the man working on the machine has the key to the lock. That machine cannot be started until the lock be removed. Should the central control room operator try to start the plant with a production unit locked out, that light will not show on the board and, through functioning of the interlocking circuit, no equipment ahead of such shut down unit can possibly be started.

Every unit of equipment is carefully grounded, practice being to run a ground wire in every conduit from the switch to the motor all the way to the control room. Any production unit can be stopped by pushing the switch at the motor in event of emergency, in which case all preceding equipment is also immediately halted. Operation of equipment so stopped cannot be resumed until the motor switch which was manually shut off is manually reset. Emergency stop buttons and pull cords are located at all equipment throughout the plant, and welding outlets (440 v.) are available at all floor levels.

Specifications

Screen analyses are essential to control of the blending operations and there are three men trained to take samples and conduct sieve analyses as required. Space has been set aside on the blending belt floor for these



EXHAUST POINTS STARTING FARTHEST AWAY FROM DUST COL.	AIR VOLUME C.F.M.	BRANCH DIA.
HEAD PULLEY BELT NO 3	2000	10
SCREEN NO 6B&6A HOPPER DISCHARGE TO BELT 4W		
BELT NO 4W HEAD PULLEY	5000	16
SCREEN NO 3	5000	16
SCREEN NO 4	5000	16
SCREEN NO 5	4000	14
CONVEYOR NO 1 HEAD PULLEY	2000	10
NO 1 CONVEYOR DISCH. TO NO 2 CONV	2000	10
SCREEN NO 1	5000	16
SCREEN NO 2	3000	12
TOTAL C.F.M.	33000	

SYSTEM NO 1

EXHAUST POINTS STARTING FARTHEST AWAY FROM DUST COL.	AIR VOLUME C.F.M.	BRANCH DIA.
SCREEN NO 6B&6C HOPPER DISCHARGE TO BELT NO 4E	5000	16
BELT NO 4E HEAD PULLEY		
SCREEN NO 3A	5000	16
SCREEN NO 4A	5000	16
SCREEN NO 5A	4000	14
HOPPER DISCHARGE TO BELT NO 3	2000	10
CONV NO 2 DISCH TO SCREEN 1-1A	2000	10
SCREEN NO 1A	5000	16
SCREEN NO 2A	3000	12
TOTAL C.F.M.	31000	

SYSTEM NO 2

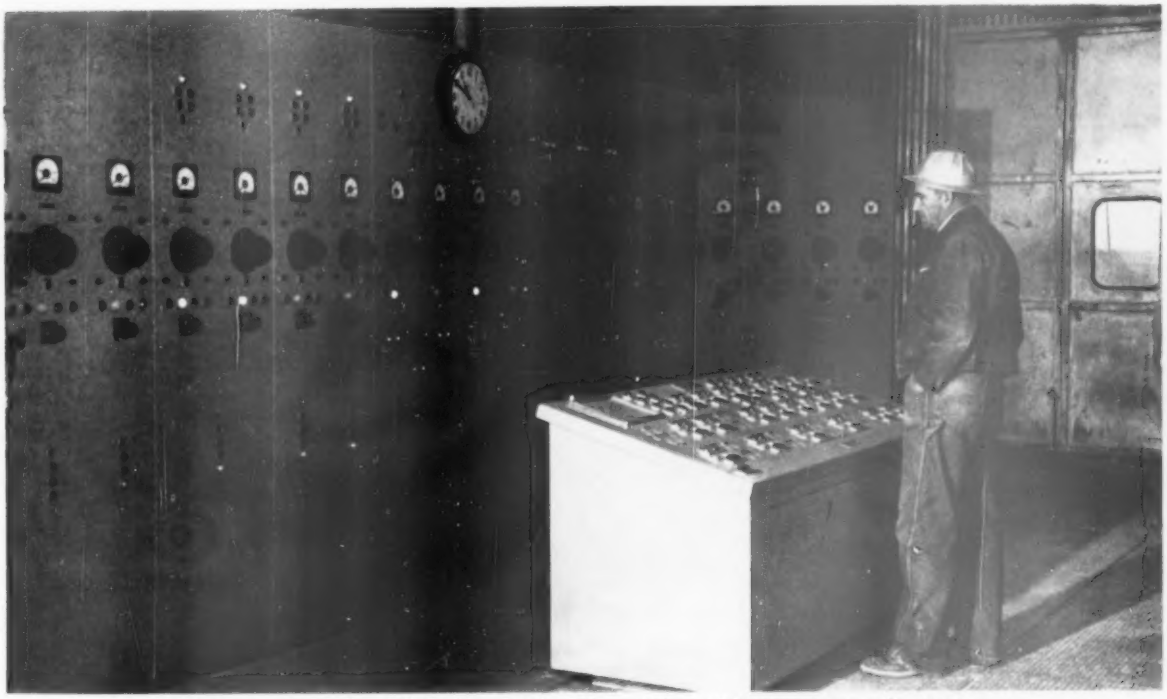
EXHAUST POINTS	NO REQ'D	AIR VOLUME C.F.M.	BRANCH DIA.	BRANCH TOTAL C.F.M.
BIN (COLS 1-8 A-C)	7	1000	7	7000
DISCH TO CONV NO 5	5	750	6	3750
DISCH TO CONV NO 6	3	750	6	2250
DISCH TO CONV NO 9	5	750	6	3750
TRANSFER CONV NO 5 TO NO 6	1	750	6	750
TRANSFER CONV NO 9 TO NO 10	1	1000	7	1000
TRANSFER CONV NO 6 TO NO 4	1	750	6	750
TOTAL C.F.M.				19250

SYSTEM NO 3

EXHAUST POINTS	NO REQ'D	AIR VOLUME C.F.M.	BRANCH DIA.	BRANCH TOTAL C.F.M.
BIN (COLS 1-8 C-B)	7	1000	7	7000
DISCH TO CONV NO 7	3	750	6	2250
DISCH TO CONV NO 8	3	750	6	2250
DISCH TO CONV NO 11	4	750	6	3000
DISCH TO CONV NO 12	4	750	6	3000
TRANSFER CONVS 11-15 7	1	1750	9	1750
TRANSFER CONVS 12-16 8	1	1750	9	1750
TOTAL C.F.M.				21000

SYSTEM NO 4

Dust control layout for stone screening and blending plant showing duct sizes and capacities throughout



Push button station and vertical panel for operating entire screening and blending plant, handling 750 t.p.h.

tests where the men have the necessary space and equipment including scales and both Gilson and Tyler testing machines and sieves. Sieve analyses are run of the products coming from the separate secondary crushers as needed, as a check on the need for resetting or maintenance. Such analyses are also run of blended products at sufficiently frequent intervals to check on the sieve analyses and as a guide to setting of the blending belt feeders.

With this system, it is easy to meet the many standard specifications or to blend to meet a customer's special requests. Where a specification sets upper and lower limits between successive sieve sizes but the customer actually prefers the product to fall half-way between, that can be done with accuracy. Blending operations are being controlled slightly on the coarse side to allow for size reduction due to falling and handling, so accurate is the degree of control. Should a customer complain that his stone is off in sieve analyses, the plant control is such that it can quickly be adjusted according to his requests for change as loaded. Rejections have been eliminated almost entirely since the new plant was built.

A glance at the loading slips for orders shipped over a few days serves to illustrate the types and variety of specifications that are being met as a regular routine, both in Oklahoma where specifications are based on square openings and in Texas where they use round openings. Such specifications for a period of a few days, when the plant was visited, were as follows:

(1) 1½-in. stone (regular concrete)
100 percent minus 1½ in.
85 percent minus 1 in.
30 percent minus ⅜ in.

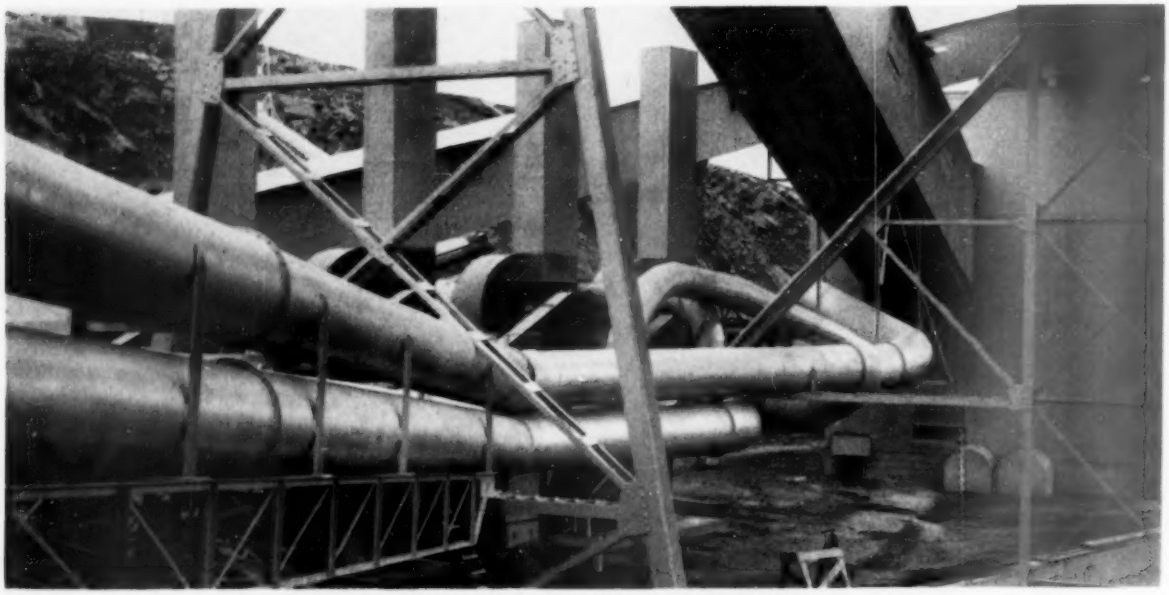
(2) State 2½-in. paving stone (concrete)
100 percent minus 2½ in.
95-100 percent minus 2 in.
70- 95 percent minus 1½ in.
50- 85 percent minus 1 in.
15- 40 percent minus ½ in.
0- 5 percent minus No. 4

(3) Oklahoma City (federal) 1½- to 3-in. stone
100 percent minus 3 in.
0- 10 percent minus 1½ in.

(4) 1-in. stone (general use)
100 percent minus 1 in.
85 percent minus ¾ in.
35- 40 percent minus ½ in.
15- 20 percent minus ⅜ in.
0- 5 percent minus No. 4

(5) State (traffic bound surface course)
100 percent minus ¾ in.
60- 90 percent minus ½ in.
30- 70 percent minus No. 4

Dust is removed as sludge from hydraulic collectors and conveyed to settling basins. Three of four units are shown here



View of four hydraulic dust collectors showing main ducts

0- 25 percent minus No. 20
0- 10 percent minus No. 200

(6) 1½-in. class A (highway stone)
100 percent minus 1½ in.
90-100 percent minus 1 in.
25- 60 percent minus ½ in.
0- 5 percent minus No. 4

(7) Special ¾-in. (government airbase)
100 percent minus 1 in.
90-100 percent minus ¾ in.
20- 55 percent minus ⅜ in.
0- 10 percent minus No. 4
0- 5 percent minus No. 8

(8) Special 2-in. Turnpike base
100 percent minus 2 in.
65-100 percent minus 1½ in.
40- 60 percent minus 1 in.
28- 45 percent minus ¾ in.
13- 28 percent minus ⅜ in.
0- 5 percent minus No. 4

(9) Chips—State Sealcote
100 percent minus ½ in.
95-100 percent minus ⅜ in.
0- 20 percent minus No. 4
0- 5 percent minus No. 10

(10) Special ¾-in. (State)
100 percent minus ¾ in.
25- 60 percent minus ½ in.
0- 15 percent minus ⅜ in.
0- 5 percent minus No. 4
0- 3 percent minus No. 10

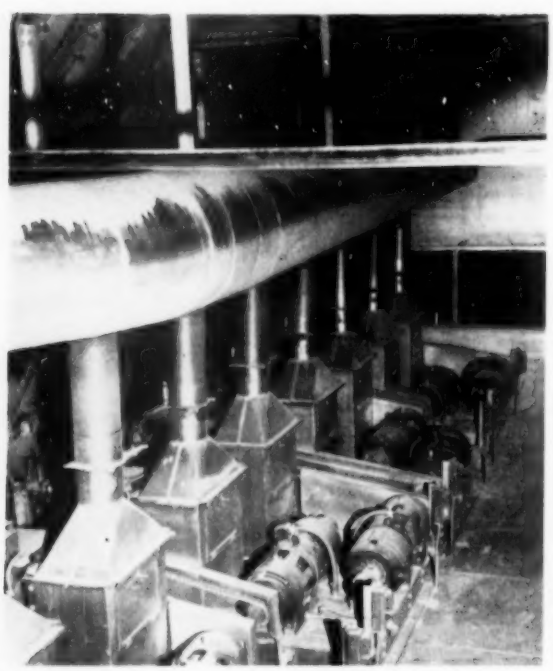
(11) Special base course
100 percent minus 2 in.
65-100 percent minus 1½ in.
40- 60 percent minus 1 in.
28- 45 percent minus ¾ in.
0- 10 percent minus ½ in.
0- 5 percent minus ⅜ in.

(12) Special ¾-in. for Texas airbase
97-100 percent minus ¾ in.
75- 85 percent minus ½ in.
50- 60 percent minus ⅜ in.
7- 17 percent minus No. 4
0- 5 percent minus No. 10

(13) 4-in. to ¾-in. stone
100 percent minus 4 in.
35- 70 percent minus 2¼ in.
0- 15 percent minus 1 in.
0- 5 percent minus ¾ in.

(14) Ballast for Rock Island Railroad
Same as regular 1½-in. concrete stone

(15) Agstone
90-100 percent minus No. 8
30 + percent minus 60 mesh



A battery of variable-speed belt feeders (there are 22) for blending stone with accuracy

Dust Precipitator

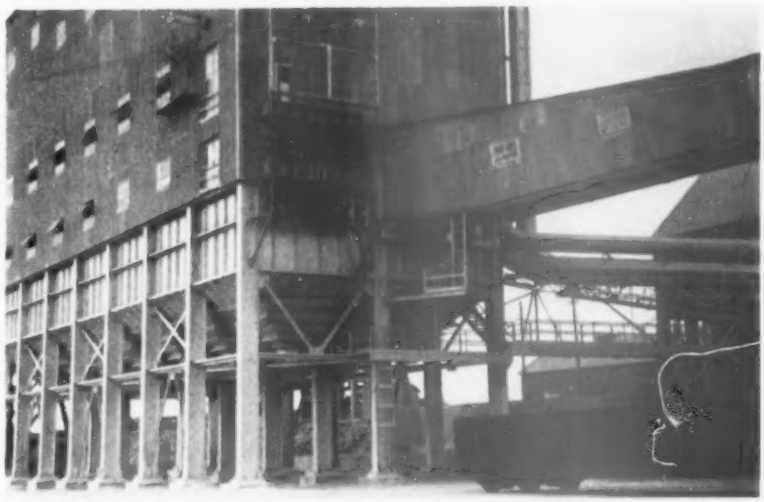
As stated earlier the central control room is tightly sealed and supplied filtered air. The electronic filter in use is new to the crushed stone industry, and is of a type that could be adapted to control panels in cement mills and other highly instrumentalized plants.

It is a model E2, size 6-84, "Electro-Matic" automatic electronic precipitator manufactured by American Air Filter Co. Rated capacity is 10,000 c.f.m. which maintains a pressure differential of plus 1.5 p.s.i. above atmospheric pressure in the control room.

In principle, dusty air first passes through an ionizer and the charged particles enter the collector units. The collector unit is of closely spaced parallel metal plates with each alternate plate charged and grounded to maintain a strong electrostatic field in the intervening space through which dust passes. Charged dusty particles are repelled by the plates of the same polarity and attracted to those oppositely charged. Practically all of the dust and smoke acquires a positive charge and is deposited on the grounded plates.

Dust particles collected in the vertical curtain are held suspended in a viscous film rather than directly on the metal plates themselves. The film is renewable daily by automatic immersion of the plates in a bath. Dust settles in a reservoir and is removed as a sludge after periods of from 3 to 6 months. A traveling scraper removes sludge accumulating on the stationary assembly of charged plates. The grounded plates are mounted on endless chains that rotate through the bath for cleaning and recoating with "Viscosine."

Required voltages for the ionizer and collector plates are obtained through a vacuum tube rectifier unit, 115-volt current being transformed to the required voltages and converted to direct current. The unit is of a type developed for industrial ventilation and air conditioning, and its self-cleaning features and automatic operation guarantee a uniform air volume. It removes soot and smoke as well as dust at high efficiency.

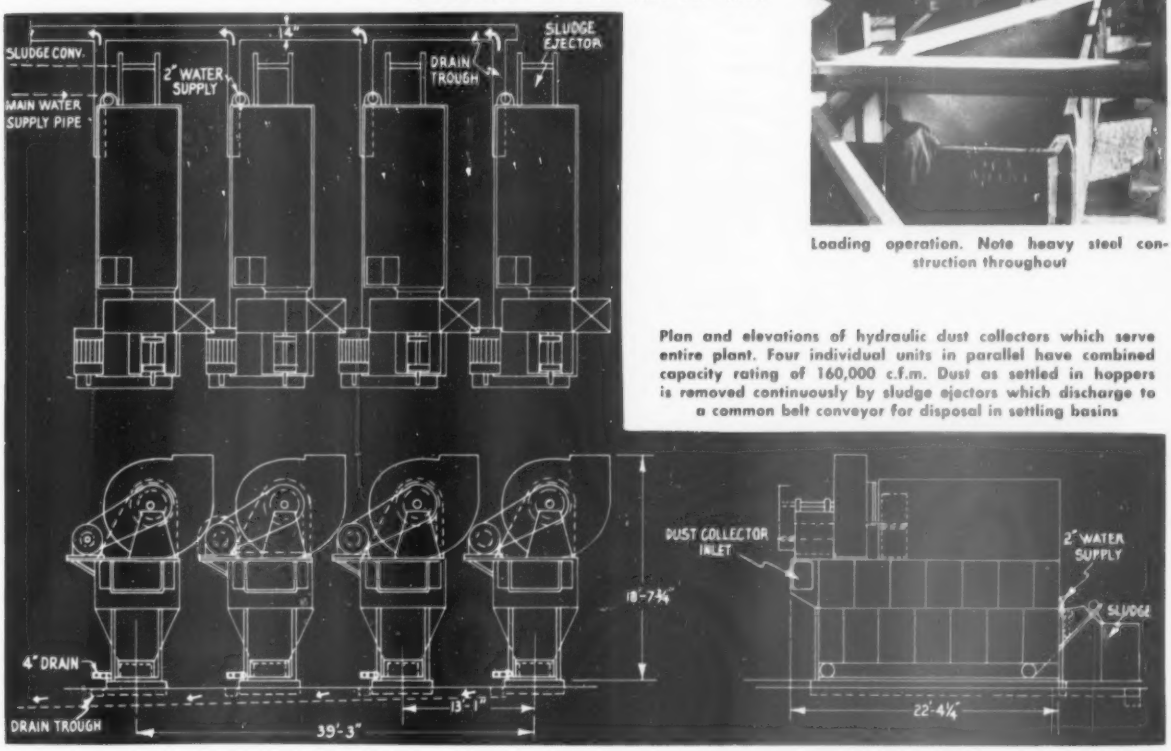


Conditions within each of fourteen 250-ton finished stone bins are always known to men spotting cars under bins for loading. Each bin has three lights, as shown here, to indicate degree of fullness. The lights show red, green or amber from top to bottom according to whether the bin is approaching full, has a normal floating load or is nearing empty, respectively. These lights are duplicates of those showing at each bin at the loading level, in the plant itself and in the central control room. Cars are moved from the right for loading

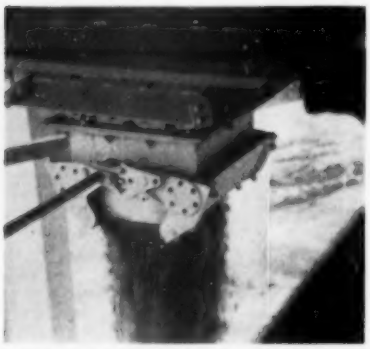
Hydraulic Dust Collectors

Dust collection is unusually effective for a dry process plant. Bins are tightly covered over, and the design provided for hoods and ducts to trap dust at every transfer point throughout the entire plant. Hydraulic collectors were selected for their

Loading operation. Note heavy steel construction throughout



Plan and elevations of hydraulic dust collectors which serve entire plant. Four individual units in parallel have combined capacity rating of 160,000 c.f.m. Dust as settled in hoppers is removed continuously by sludge ejectors which discharge to a common belt conveyor for disposal in settling basins



Loading gates are hand-operated as shown. An interesting feature is that a horizontal baffle within bin, just above draw-off gate, supports most of the weight of stone and makes it easy to open and close gate

high efficiency and for ease in the handling and disposal of dust.

All the ducts from every level and direction lead to four main ducts up to 40-in. diameter through which dust-laden air is drawn into the collectors. The collectors are four identical No. 40, Type N, American Air Filter Co. hydrostatic precipitators which operate in parallel to divide the load. Design layout called for a total of 142,250 c.f.m. Air velocities in the ducts were designed for 3750 f.p.m. The total system resistance was calculated at 12 in. w.g., using the full capacity of each Roto-Clone. Each unit is rated at 40,000 c.f.m. and has a 125-hp. splash-proof motor driving the fan. Power requirement is actually about 112 bhp.

These "Roto-Clones" clean the air by the combined action of centrifugal force and thorough intermixing of water and the dust-laden air, the cleaning action being effected through an inverted S-shaped water curtain. The water curtain is created by the induced flow of air through a stationary baffle. Lower opening of the baffle is partially immersed in water.

Air flowing through the baffle at high velocity carries the water with it in a heavy turbulent sheet along the inner surface of the lower baffle plate. The speed is such that it reverses direction to follow the curve of the upper blade. With the air passing through this curtain of water in a sinuous passage, the centrifugal force exerted by the rapid changes in direction of flow causes the dust particles to penetrate the water film and become trapped. It is a combined action of washing and scrubbing.

These particular units, being the largest of this type manufactured, have double baffles for a divided stream. Dust is settled in the reservoir below, from which it is removed as a sludge or slurry. No pumps are required and the water is continuously reused. It requires about 3000 gal. of water to fill the reservoir in each of the units and the water use requirement is about 300 g.p.h. each, to take care of evaporation and that removed with the dust. Water level is maintained by an overflow weir, with the fresh water automatically added as required through control by a metering orifice.

These particular units are of hopper bottom design with drag-type sludge ejectors for continuous and automatic dewatering and removal of collected material. The ejectors look much like a dewatering sand drag and are of 6-sprocket design which provides a horizontal drag section in the bottom of the hopper. Each is driven by a ½-hp. motor through a V-belt drive to a gear reducer and roller chain drive to the ejector upper shaft. Speed of the ejector is 2 f.p.m.

The four collector units being in a row, the ejectors discharge sludge onto a common horizontal belt conveyor which transfers to an inclined belt conveyor for disposal in settling basins. There are three basins which are cleaned out by clamshell at intervals of two weeks. Sludge thus recovered is interblended with the agricultural limestone in stockpiles to sweeten the fine size fraction

Recovery is 20-25 tons of dust in 10 hr. of operation under the most adverse conditions, and efficiency is estimated approximately 99 percent by weight. A typical sieve analysis of the dust is 88.7 percent minus a 200-mesh sieve, 84 percent passing a 270-mesh sieve and 80 percent through 325-mesh. With the water in the reservoir being replenished, the efficiency is very high and there is no evidence at all of dust escaping through the exhaust stacks. Roughly, the collectors measure 22 ft. in length and 18 ft. 6 in. in height. Hopper height is 6 ft. Electrical heating elements in the Roto-Clones prevent overnight freezing of the water during cold weather.

Hydraulic dust collectors are centrally located with respect to plant structures. Shown here are the main ducts to the collectors. Capacity is 160,000 c.f.m. and actual air volume, as shown in the table, is 142,250 c.f.m.

Power Requirements

Total connected electrical power is 2000 hp. in motors. Major units are a 275-hp. motor driving the primary crusher, 200 hp. for the 5½-ft. cone crusher, 150 hp. for the 4-ft. short head cone crusher, 100 hp. for each of the 4-ft. standard cone crushers, 150 hp. for the belt conveyor delivering to the secondary crushing plant, 100 hp. for the primary belt conveyor to the screening and blending plant and 15 hp. for each vibrating screen. All motors of 50 hp. and more are supplied 2300-volt current and those under 50 hp. are 440 volt. Power is purchased from the Public Service Co. of Oklahoma.

Repair

Practice at the Richards Spur plant is to standardize as much as possible on equipment in order to simplify repair, maintenance and inventory. There is also considerable standardization throughout all plants of the company as a unit. At Richards Spur, almost all motors are General Electric and the drives for all equipment in the new screening and blending plant have Jones herringbone speed reducers. Vibrating screens are by Robins throughout the screening and blending plant. All quarry trucks are Euclid and their engines are standardized between Cummins and General Motors.

Richards Spur is far removed from any metropolitan area and it is essential that the plant do almost all of its repair work. It is equipped for complete overhauling jobs on trucks as well as engines, cranes, shovels and other major equipment. Local machine shops are available for certain outside work with the exception of making major castings.

A program of inspection and preventive maintenance is in practice. All trucks are inspected according to a regular schedule and records kept on their condition. They are pulled out of service, one at a time, for major work. The shop is equipped for the buildup of wear resisting hard metals including manganese steel surfaces on any equipment. A program of preventive maintenance applies to heavy production units as well as truck equipment. Crushers are disassembled once a year for a complete going over, when new parts are installed to carry them through a year

of operation. Chain hoists are available wherever needed through the plant for handling and lifting heavy parts even to having outriggers at the top of the screening and blending plant so that machinery parts may easily be raised.

On all motor rewind jobs, class B (fiber glass) insulation is being installed as a means to increase power attainable from the motors through reduced temperature. The plant is adequately staffed with skilled electricians.

While the new plant has 14 finished material bins of 3500 tons total capacity, it was constructed so that more bins can be added at a later date if that proves necessary. Foundations go to a depth of 16 ft. to bedrock on one side and there is a 3-ft. thick, continuous reinforced concrete mat or footing for the balance of support. This footing extends 8 ft. outside the support limits so that it would be simple to tie in vertical supports for additional bins.

Shipments

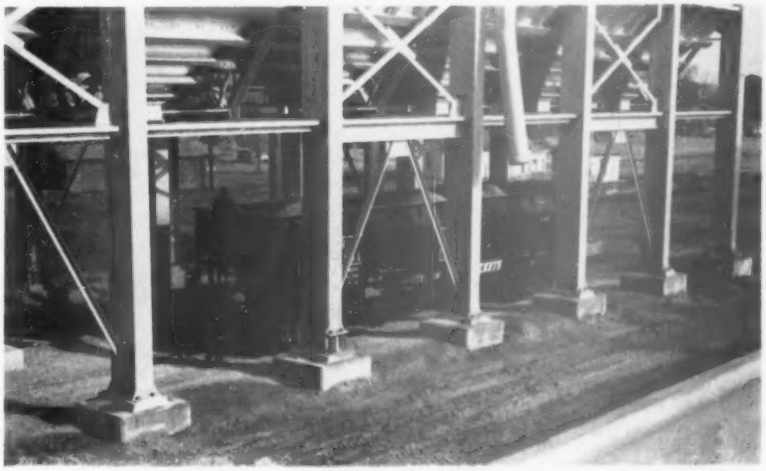
The plant office is in constant and direct contact with the Oklahoma City headquarters by telephone and teletype. All orders received by telephone or teletype are confirmed by mail. Throughout the plant all the way to the truck ramp there are loudspeakers stationed as part of an intraplant dial telephone system. There are 24 stations in this private telephone system for use in transmitting shipping instructions, relaying messages and paging men.

Shipments out of Richards Spur are over a 100-mile radius including Oklahoma City. Distribution is 70 percent by rail and the balance via truck.

Engineering-Contracts

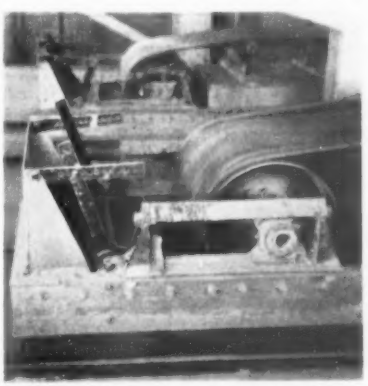
Dolese Bros. Co. officials and operating executives conceived the basic design of the plant, and much credit is due George L. Richert, recently deceased, who was then chief engineer of the company and who worked on the basic design through its completion. His associates and his many friends have suffered a grave loss, both personally and professionally, through his untimely death. Much credit is also due to George E. Howard, formerly vice-president and treasurer of the company, for contributing many ideas which were incorporated into the final plans. Mr. Howard's resignation due to long continuing ill health was recently reluctantly accepted.

Robins Engineers, division of Hewitt-Robins, Inc., was awarded the contract for engineering and construction through to completion of the contract, for the entire screening and blending plant back to the secondary crushing plant. Robins supplied the vibrating screens, conveyors and belting throughout and did the electrical engineering and developed the belt feeders for this special problem of blending. Robins sublet the fabrication to Capitol Steel and Iron Co., Oklahoma City, and Western Steel Erectors constructed the building. J. McDonald and Co., Chicago, was the millwright contractor. General Electric Co., manufactured the electrical control system and supplied the control equipment, and Industrial Electric Co., Oklahoma City, was awarded the electrical installation contract.



Showing car being loaded. Each of the 14 bins holds 250 tons. Note heavy bin construction

The name "Dolese" is one of the oldest identified with the crushed stone industry and goes back to the time when John Dolese, Sr., was a co-founder of Dolese and Shepard Co. in Chicago. Four sons, William, John, Jr., Henry and Peter, formed the original Dolese Bros. Co., an Illinois Corporation, in 1902, starting out in Illinois in the paving and contracting business. Although successful in the contracting business, they soon became interested in the quarry business through contracting to produce railroad ballast. Later the quarries they purchased and developed in Illinois, Iowa and other midwestern and southwestern states became the sources for commercial aggregate for construction work as well as railroad ballast. Roger Dolese, president of the present Dolese Bros. Co., and also president of The Dolese Company, is of the third generation in the industry.



Close-up of discharge end of shuttle belt conveyor, discharging blended stone into one of the finished stone bins. Note quadrant paddle device which revolves as stone impinges on it which causes inter-mixing and thereby minimizes segregation

These two companies are among the largest and most progressive anywhere in the rock products industries. They are large producers of sand and gravel and ready-mixed concrete as well as crushed stone, with plants located throughout Oklahoma and in Wichita, Kansas.

Dolese Bros. Co. operates the crushed stone plants in Oklahoma and Kansas and the sand and gravel plants and the ready-mixed concrete plants in Kansas. The Dolese Company operates the sand, gravel and ready-mixed concrete plants in Oklahoma. Crushed stone plants are located at Big Canyon, Bromide and Rayford, Oklahoma, in addition to Richards Spur. All are limestone operations and the one at Big Canyon has a capacity comparable to Richards Spur. Sand plants are in operation at Tuttle, Dover and Oklahoma City and at Wichita, Kansas.

Ready-mixed concrete operations are among the largest in the United States, with some 100 transit mixers in operation. Plants are located at Enid, Norman and Oklahoma City and also at Wichita, Kansas. Seven transit-mixer batching plants are in production at Oklahoma City.

It is evident from our description of the Richards Spur plant that Dolese has progressive management backed with a great deal of experience and that it comprises a smooth-working organization.

Roger Dolese, president, is the type who insists on perfection down to the last detail and his thinking and ideas are reflected throughout the

(Continued on page 180)

View of plant from top of truck loading bins. (A) Belt from pit to surge pile. (B) Pea gravel stacker belt. (C) Slurry belt conveyor to ground storage. (D) Main electrical control station. (E) Silos under gravel plant. (F) Bowl classifier. (G) Loading surge bins with screens below. (H) Sand stacker belt conveyor. (I) Sand wheel. (J) Main operating tower. (K) Slurry mill

PRODUCE MANY SIZES IN COMPACT PLANT

Radam plant of Henry J. Kaiser Co. is one of the plants scheduled for inspection by convention visitors. Features sand recovery and interesting conveyor system

By WALTER B. LENHART

PRODUCTION OF A LARGE NUMBER of sizes under flexible operating conditions has been achieved by the Henry J. Kaiser Co. in a very compact layout at its Radum plant near Pleasanton, Calif. Most of the plant is operated from a glass-enclosed operating tower that dominates the gravel processing section. The original plant was built in 1931, but in 1937 it was rebuilt, doubling the capacity. Since the plant was rebuilt other changes have been made to improve operation until today it is one of the most elaborate in the industry.

A visitor to this plant is at first bewildered by the complexity of the operation. The following description may therefore serve as a guide to make the scheduled inspection easier and more understandable to the membership of the National Sand and Gravel Association and the National Ready Mixed Concrete Association as a side trip for the San Francisco annual meeting in February, 1953.

Operations of the Radum plant can be divided as follows: (1) pit to surge pile; (2) coarse gravel preparation section; (3) smaller gravel section; (4) crushed gravel plant; (5) slurry mill; (6) sand classification; (7) loading; (8) stacking; (9) rod mill grinding; and (10) hot plant.

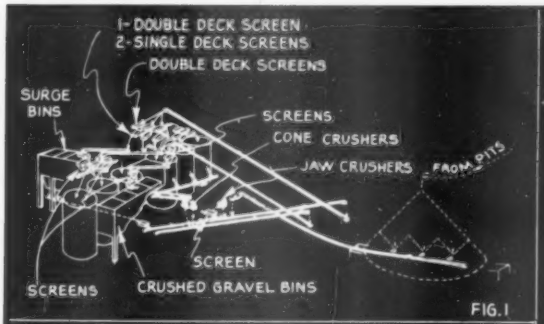
The flow sheet gives the essentials of these operations, excepting the rod mill grinding. Its arrangement is shown in Fig. 5.

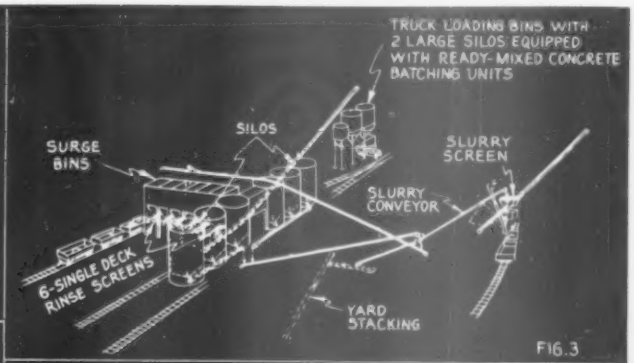
Isometric sketches in Figs. 1 to 4 show the general plan of operation.

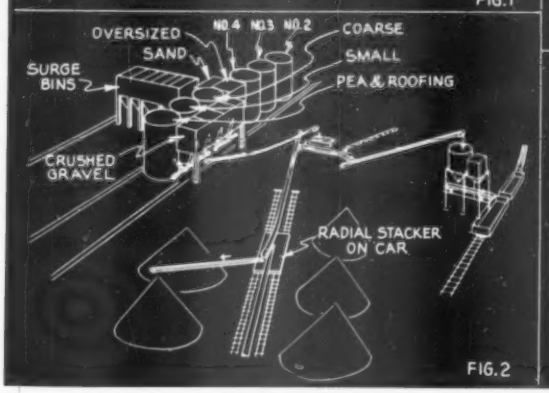
The Radum plant is not only an interesting operation, due to its size and complexity of operation, but to the glamour that is associated with its owner, Henry J. Kaiser, one of the nation's great industrialists. Mr. Kaiser is still keenly interested in this plant and in the sand and gravel industry as a whole, for it was a few miles to the east, at the northern edge of the town of Livermore that Henry J. Kaiser first entered the sand and gravel business in 1923. It was here that Mr. Kaiser hit his first business jack-pot, and the paved highway over which one rides to reach the plant was one of Mr. Kaiser's first construction projects. At that time he was a relatively small contractor, and not being satisfied with gravels supplied him, built his own plant. Aside from deliveries to his ready-mixed concrete operations in Oakland and in the Radum dry batching and ready-mixed concrete plant, very little of the current production is used by any of the Kaiser contracting companies, but is sold to other buyers.

The operation can be used as a classic example of adaptation to depletion conditions in the sand and gravel industry. For years pit operations were conducted north of the main highway, but excessive overburden, more distant transportation, and thinning out of the lenses of gravel resulted in the extensive plant and pit changes. At considerable expense a new deposit was opened up on the south side of the highway and

Left: Floating pendulum conveyor with receiving hopper to feed long field belt conveyor system. Right: Preliminary washing plant in the background is served by long belt conveyor.







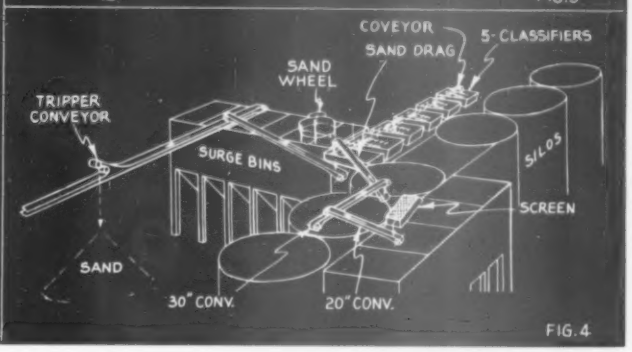
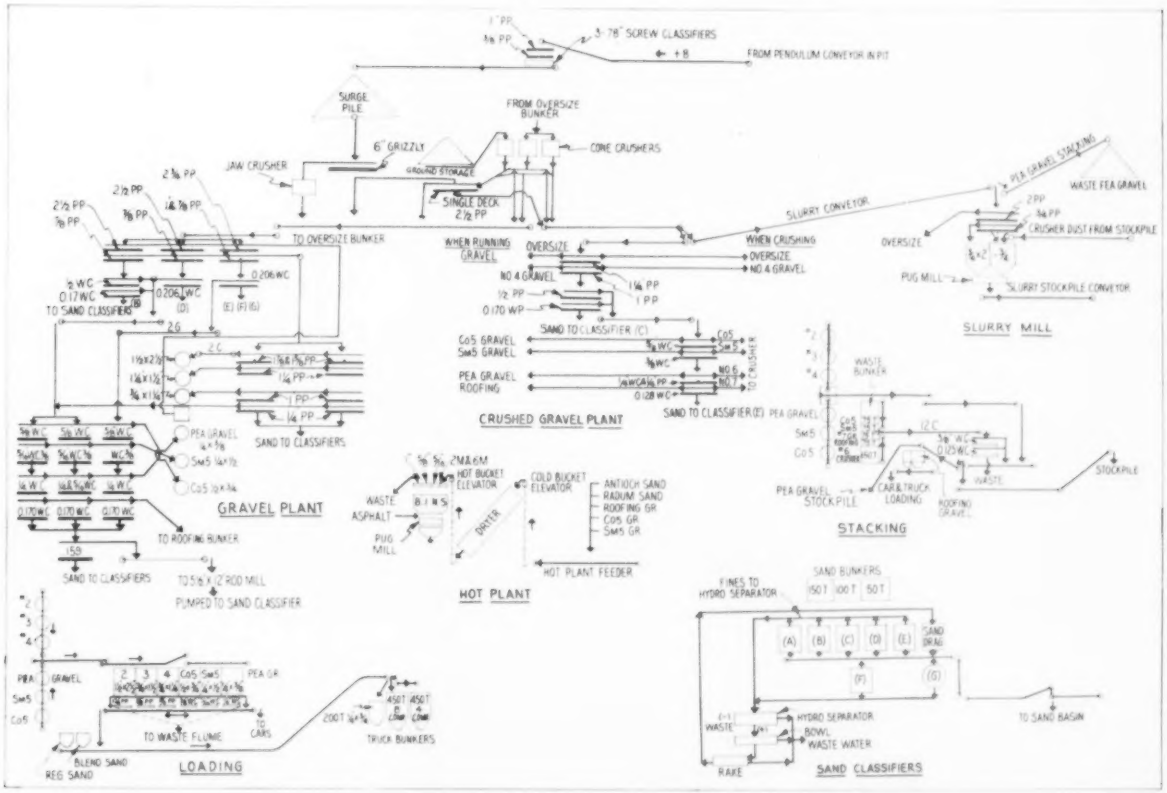


Fig. 1: Gravel crushing, washing, classifying and storing section. Fig. 2: Stacking section. Fig. 3: Mixing, loading and stacking section. Fig. 4: Sand classifier section



Flowsheet of all sections of the plant showing screen mesh and belt conveyor arrangement

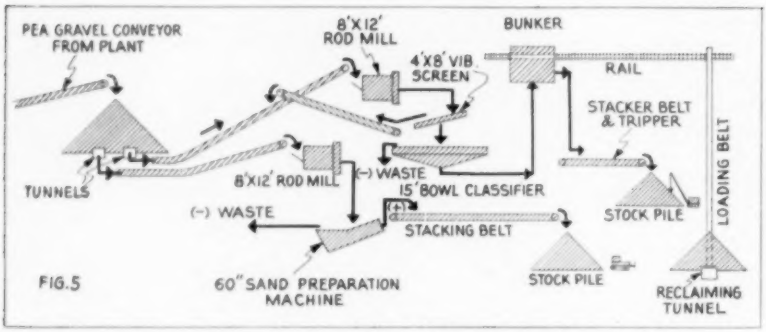


Fig. 5: Flow diagram of section for the production of manufactured sand

a preliminary washing plant built there.

Belt conveyors are used to a superlative degree in this operation, both long and short. All conveyor idlers and return rolls are made in the company's shops at Radum. The belts range in width from 48 in. down but are principally 30, 36 and 42 in. As belts are purchased from manufacturers on a bid basis practically all makes are found. The plant uses between one and two miles of belt conveyors. Field belts are installed as required with no definite specification for length or for horsepower required.

Considerable information has been published by the California state agencies on the geology of the Livermore district. One main characteristic is that the deposits are relatively deep but irregular as to bottom contours. At Radum, gravels are dug to about 100 ft. with about 50 ft. below-water levels. Some stripping is done using Caterpillar and Le Tourneau road scrapers. The gravel is relatively small in size so that a large primary crusher is not necessary; however, as recent changes in California highway specifications indicate that minus 1½ in. will be the top size for concrete and asphalt work, secondary crushing is important. Here, three 4-ft. cone crushers are available.

The third cone crusher installation, a later addition, is fed from ground stored large aggregate to produce crushed gravel. Much of the detail design in the screening plant was made necessary by the excess pea gravel. Punched plate is used extensively for the larger sizes of washed gravel and crushed gravel. Digging under water, preliminary washing in the pit, soaking enroute to the surge pile, and soaking in the surge pile, followed by adequate washing in the plant has solved the clay problem here.

It is well to bear in mind that the four isometric sketches illustrate operations that are all integrated into one plant by the transportation units (conveyor belts, pumps, etc.). Operations have been segregated into four main plant segments as a guide for visitors to the plant.

Concrete surge bins may be identified in one of the illustrations which shows the company's name. The six cylindrical silos, shown in the isometric drawings, and the rectangular bins for crushed gravel are for primary storage. The sand basin is a drainage and storage area. In the flow diagram, Fig. 5, the three sand bunkers shown are really under the sand classifiers so that if a conveyor breaks down the bunkers can be filled direct.

The general method of operating at Radum is to run the pit and the two large rod mills at night, or when the main plant is not operating. As electric power requirements for the two divisions are about equal, this method of operating cuts the peak power demands in half. However, during the day shift, pit-run material can be sent to the gravel plant, in which event one of the smaller diesel draglines with bottom dump trucks delivers pit-run to a receiving hopper in the pit and the sand and gravel are sent direct to the surge pile, bypassing entirely the preliminary washing and screening plant located on the south side of the road.

Plant laboratory may be seen to the left of conveyor leading to truck bins and batchers, on the right. In the right foreground is the plant office

Pit Equipment

The pit operations at Radum can be divided into two divisions: digging above water, and digging below water. Digging above water permits some selectivity for material for crusher-run base and permits excavation to any possible clay seam and the removal of that seam without sending it to the processing plant. The two 5-cu. yd. draglines are used mainly for above-water digging. No special attempts are made to control water horizons by pumping.

The bulk of the material going to the plant's surge pile comes from underwater digging, using the 10-cu. yd. Bucyrus-Erie walking Monighan. This unit dumps to a floating pendulum conveyor, possibly the only unit of its kind found anywhere in the sand and gravel industry. One of the illustrations shows the essentials of this device. It has a large receiving hopper under which is a feeder serving the pendulum's belt conveyor. The outboard or discharge end of the pendulum straddles the main pit belt and is made portable by riding that end on steel rails with flanged car wheels. As digging proceeds the hopper end can be moored into position and the outboard end moved on the rail assemblies. Digging below water varies in depth up to 50 ft.

The pendulum serves a series of three 42-in. field belt conveyors which deliver the pit-run (wet) material to the preliminary washing section which is located on the south side of the highway near the plant. It consists of two wet 5- x 14-ft. Ty-Rock double-deck vibrating screens that receive a split feed from the field belt conveyors. The top deck is a "wear-taker" with a ⅜-in. bottom deck. All plus fractions fall to a 36-in. belt conveyor that passes through a tunnel under the railroad tracks nearby via a total of four more 36-in. belt conveyors, the material being delivered to the surge pile located near the plant and on the north side of the paved highway.

The minus ⅜-in. material from the Ty-Rocks splits and goes to three 78-in. Wemco sand preparation machines each powered with a 15-hp. motor. Here the unwanted minus 200-mesh material and practically all of the clay is removed and sent to waste. The washed minus ⅜-in. material

joins the plus fractions from the vibrating screens and is sent to the surge pile.

The 78-in. sand preparation machines are believed to be the largest size used in the sand and gravel industry although recently several 84-in. units were installed in the copper mining industry. Two of the Wemco's were in the older pit operations on the north side of the highway and functioned for many years. This pit has been depleted. When operations were shifted to the new pit, a third Wemco unit was added. These machines have handled over 2,000,000 tons of material with a maintenance cost of only 0.04 cent per ton. The amount of plus 200 mesh in the overflow from all three of these machines is only about two tons per hour and much of this is the minus 100-mesh to 200-mesh size that is not essentially wanted. Sieve analysis of the plus 200-mesh material in the overflow from the weirs is as follows:

	Mesh	
Minus	30	100 percent
	50	98 percent
	100	57 percent

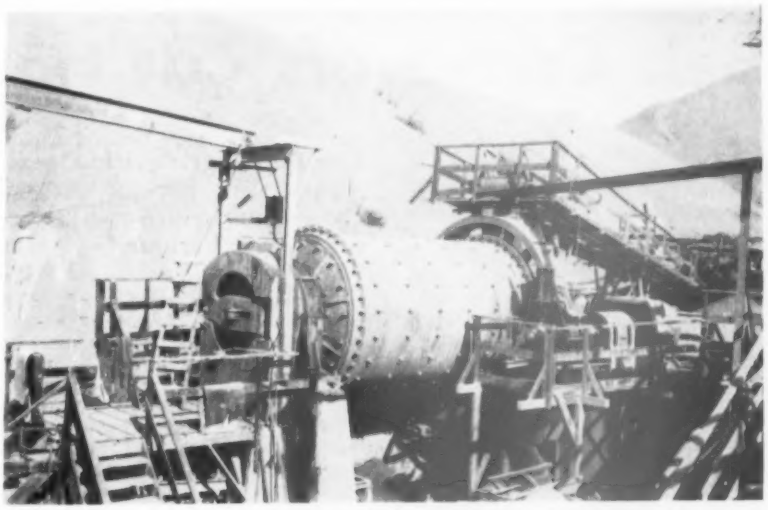
The surge pile near the plant has a capacity well over 10,000 tons, and enough material is sent to it every working day to keep the plant supplied with roughly 1000 net t.p.h. when working at normal capacities. The pit normally operates at night, with the exceptions noted, and repairs are made in the daytime. Buckets are surfaced with abrasion resistant (AR) segments, and hard surfacing is applied with the electric torch where most needed. The plant has a nominal capacity of 1000 net t.p.h., but often hits peaks of 1200 net t.p.h.

Pit and plant equipment includes the following: No. 6160 10-cu. yd. Bucyrus-Erie electric walking Monighan dragline; No. 5-W 5-cu. yd. Bucyrus-Erie diesel walking Monighan dragline; No. 85B 5-cu. yd. Bucyrus-Erie electric dragline; two, wet 5- x 14-ft., double-deck Ty-Rock screens; three 78-in. dia. Wemco sand preparation machines; three 42-in. field belts to preliminary washing machines; five 36-in. field belt conveyors from preliminary washer to surge pile at plant; two DW-10 Caterpillar tractors with scrapers; one HD-20 Allis-Chalmers tractor and dozer; four D-8 Caterpillar tractors and dozers; one D-4 Caterpillar tractor and dozer; one DW20 Caterpillar tractor pulling a Caterpillar W20 wagon; and a 17-cu. yd. Euclid bottom-dump haulage unit.

The main units in the plant include the following equipment: one 18- x 30-in. Allis-Chalmers jaw crusher; 13 Symons vibrating screens (4 x 16 ft., 4 x 10 ft. and 4 x 12 ft.); seven Robins vibrating screens; six Niagara vibrating screens (4- x 8-, 4- x 10-, 4- x 12-, and 5- x 12-ft.); two Ty-Rock vibrating screens; two 8- x

(Continued on page 182)

Shops are shown in the foreground with the sand manufacturing plant and pea gravel storage in the background



One of the 8- x 12-ft. rod mills used to manufacture sand from pea gravel

Preliminary wash plant with screens, above, and sand preparation machines, below

Plant in background with area being excavated in foreground. Shovel in foreground casts material to a higher level where other shovels load haulage units

Belt Conveyors Cut Handling Costs

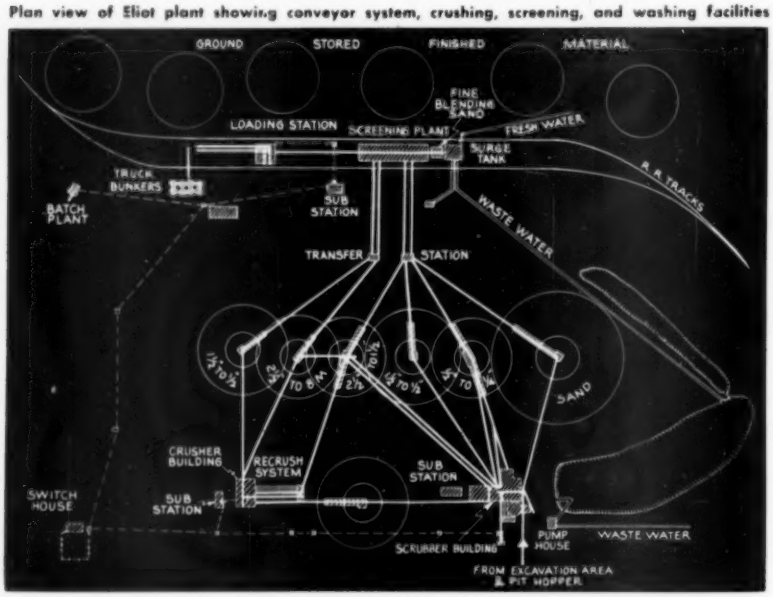
Eliot plant of Pacific Coast Aggregates, Inc., is one of the outstanding plants scheduled for tour

LOCATED IN THE LIVERMORE VALLEY near Pleasanton, Calif., is the very modern Eliot plant of Pacific Coast Aggregates, Inc. This is one of the plants scheduled for inspection by the membership of the National Sand and Gravel Association and the National Ready Mixed Concrete Association as a part of the program of the joint meeting in San Francisco, Calif., starting the week of February 22, 1953.

This plant is distinguished for the advanced engineering ideas incorporated in the design. Since its preliminary runs, no major changes have had to be made in the plant. In the February, 1951, issue of ROCK PRODUCTS a detailed description was published, and the purpose here is only to outline the operation and point out a few modifications so that those who visit the plant will have some basic data to serve as a guide.

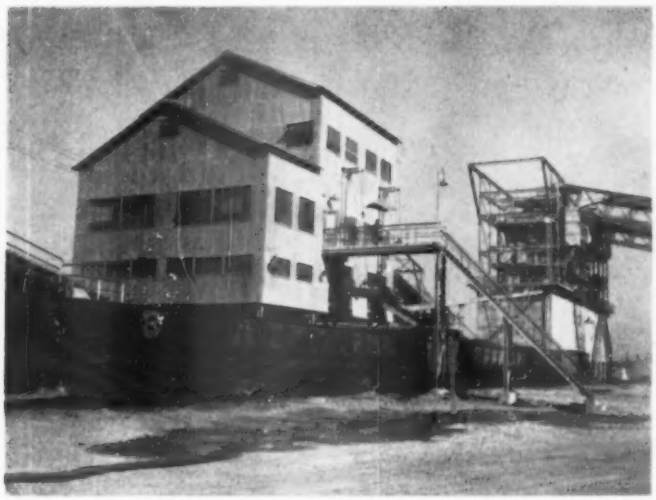
Pacific Coast Aggregates, with headquarters in San Francisco, is the largest sand and gravel producer on the West Coast and is one of the leading producers in the United States. Sand and gravel plants are located at Eliot, Kerlinger (near Tracy), Centerville, Fair Oaks, Rockfield, Lindsey, Lemon Cove, Fresno and Yolo, all in California. The Lindsey plant, the most southerly, is about 50 miles north of Bakersfield, and the Fair Oaks operation is about 15 miles east of Sacramento. Rockfield is 15 miles northeast of Fresno, The Yolo operation is the latest (1952) acquisition. Lemon Cove is near Visalia. In addition, the company has sand plants at South San Francisco, Olympia, Lapis and Prattco; the latter two are in the Monterey area. The company operates three permanent black top plants at Fair Oaks, Concord and Brisbane. In 1951 the Brisbane Rock Co., located on the south peninsula of the San Francisco Bay area, was acquired. It is a quarry operation.

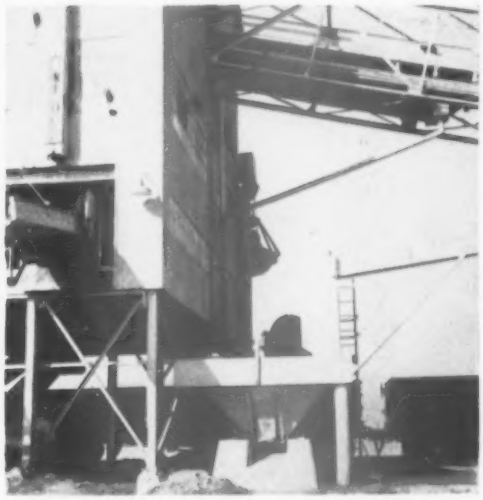
Plan view of Eliot plant showing conveyor system, crushing, screening, and washing facilities



Adjacent to practically all of the above operations, Pacific Coast Aggregates has set up ready-mixed concrete plants. These are in addition to large, modern ready-mixed concrete plants located at strategic points in Sacramento, Oakland, Fresno, and San Francisco. All of these operations will be covered in the review of ready-mixed concrete in the Bay and Northern California areas. R. K. Humphries, general manager of the company, is a director of the National Sand and Gravel Association and president of the National Ready Mixed Concrete Association.

With a capacity of 900 to 1000 t.p.h., the Eliot plant is the largest producing unit. The Kerlinger plant near Tracy serves parts of the lush San Joaquin river area and the city of Stockton, and is the second largest plant with a capacity of 500 to 600 t.p.h. Centerville is another plant serving the Oakland-Alameda Bay





Left: Final screening plant and car-loading facilities. Note operator under umbrella who controls loading. Right: Sand preparation machine, to the right, recovers sand from rinsing operations

areas. Both the Eliot and the Kerlinger plants are ultra-modern. Few plants in the United States can excel these two operations in efficiency, care in details of engineering design, neatness, and productivity. The Fair Oaks operation serves the Sacramento area, and is currently supplying aggregate for Nimbus dam, now under construction by the Bureau of Reclamation on the American River, immediately below Folsom dam on the same stream. The latter dam, however, is being built by the U.S. Army Corps of Engineers. Both dams will be integrated into the great Central Valley Project sponsored by the Bureau of Reclamation.

Belt Conveyors Used Effectively

In spite of its large size, the Eliot plant and the outlying storage area are kept scrupulously clean and orderly. The operation is so far-flung that the best way to see it is by car or bus.

The plant layout is relatively easy to understand as it is spread out into four major segments. Conveyors are used extensively, and the visitor's eye is immediately attracted to the many belt conveyors that finger out to build up the seven surge piles and the reclaiming belt conveyors that operate in concrete tunnels under the surge piles. All material is now washed, but at the outset of operations the crushed gravel section was operated dry. However, recent changes in the California Division of Highways specifications made washing of the crushed gravel expedient. Rejects from the washer (fines) flow to a pond from which they are reclaimed by a Marion dragline. All coarse material is rinsed as loaded. Fine sand that has been washed is blended into the current production at Eliot by means of a cylindrical bin and vibrating feeder at the east end of the loading belt. The fine sand portion comes from the company's Olympia sand plant.

The four main segments making up the plant are:

(1) Scrubbing, preliminary screening, preliminary crushing and sand recovery.

(2) Secondary crushing.

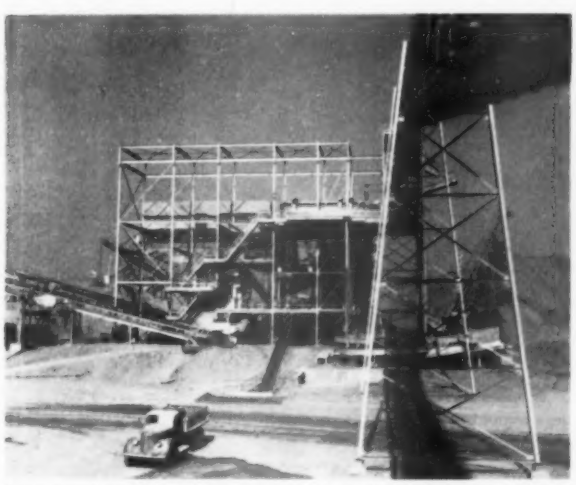
(3) Final screening plant for both gravel and crushed gravel, located over 20 concrete loading bins.

(4) Carloading plant.

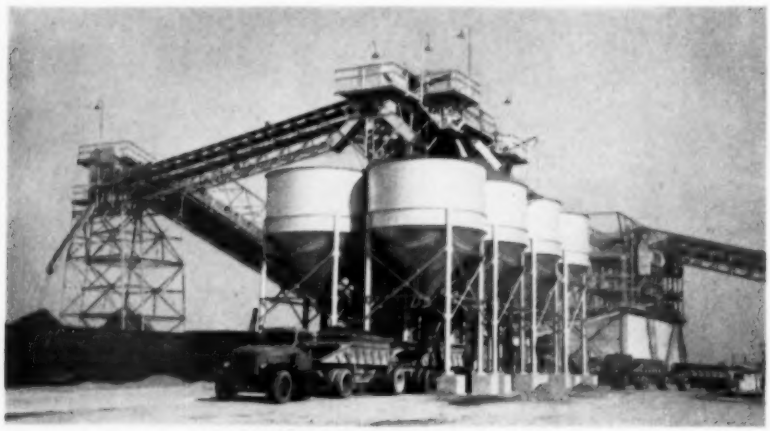
Equipment in the plant includes:

Scrubbing section—One 8- x 30-ft. Joshua-Hendy blade mill or scrubber; one Conveyor Co. sand wheel; one sand drag, one Dorr bowl rake classifier; one 8- x 12-ft. peripheral discharge Marcy rod mill; three Allis-Chalmers vibrating screens; two Allis-Chalmers 6N gyratory crushers.

Secondary crushing section—One No. 636 type R Allis-Chalmers reduction crusher; one No. 436 type R



Left: Gravel crushing plant as viewed from the preliminary washing plant. Right: Haulage unit dumping into hopper serving conveyor belt to wash plant. Surge pile, to the left, supplies material for the crushed gravel plant



About half the plant output is shipped by truck

Allis-Chalmers reduction crusher; two Allis-Chalmers vibrating screens.

Final screening plant—Ten Allis-Chalmers vibrating screens and one Conveyor Co. sand wheel in the gravel section and two Allis-Chalmers vibrating screens in the crushed gravel section.

Carloading plant—Two Allis-Chalmers vibrating screens.

Other interesting areas in this huge plant include the eight truck loading bins, the Noble ready-mixed concrete and dry batching unit, stockpiling of finished material, truck scales and the plant office with teletype connections to the company's main offices in San Francisco.

All materials at the final screening plant for both crushed and uncrushed gravel and also at the loading points are given a final washing or rinse, with the undersize and breakage flowing to a 48-in. Wemco sand preparation machine. The recovered sand is moved by belt conveyor to ground storage, and is kept separate from current production. It is a mixture of crushed and natural fragments, and the material finds a ready sale for paving driveways, filling station grounds, etc.

All railroad cars are loaded by conveyors from the bins under the screening plant with one car being loaded at a time. The concrete bins are located between two railroad tracks. Bins have provisions for later installation of gravity loading gates, if needed. Switching is done with Whitcomb and General Electric locomotives. Finished material is reclaimed from ground storage by two Brownhoist cranes. A carload of sand can be loaded by belt conveyor in 2 to 2½ min.; gravel takes about 3 min. per car. Samples of sand are taken from the car after loading; cars of larger aggregates have samples taken from the loading belt.

Sand Recovery Methods

An 8- x 12-ft. peripheral discharge rod mill is used to manufacture sand from pea gravel. This mill is mounted on a high concrete pier in the preliminary scrubbing section. The 8- x 30-ft. blade mill is the first unit in the scrubbing plant. Three sand recovery units are in this same structure: a sand drag, a sand wheel, and a Dorr bowl, duplex-rake classifier. The sand wheel is a Conveyor Co. unit. All screens in the plant are Allis-Chalmers. All belts in the far flung conveyor system are American Rubber Co., made in Oakland, Calif.; idlers are a Conveyor Co. product.

The plant with its surge piles covers an area roughly 1000 ft. sq.

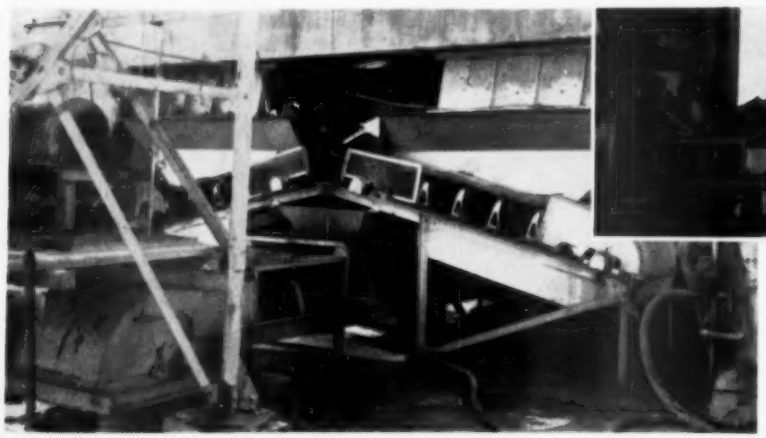
In the washing section, above the final screening plant, are glass-enclosed control stations from which the operator can see the operation. By a series of red, green and yellow lights on the switchboard, the operator can follow all phases of the plant's operation. The 20 loading bins hold 250 tons each. Two sizes of sand in bins are blended to the loading belt by short conveyors; fine Olympia sand, previously mentioned, is also blended onto the loading belt.

Recent changes in California Highway Division specifications require that all material must be 1½ in. or smaller so secondary crushing is important. All crushers are Allis-Chalmers manufacture.

Pea gravel from the company's older plant, now out of service, is occasionally trucked to Eliot from a stockpile containing several hundred thousand tons. This pea gravel goes to a truck hopper and is blended in with current production. Euclid bottom-dump trucks do this hauling.

Visitors to California will see in and about the sand and gravel and ready-mixed concrete plants types and models of trucks seldom seen in eastern sections of the country. These haulage units range from conventional rear- and bottom-dump types (some of the latter with 18 wheels) and

(Continued on page 174)



Above: Blending fine washed sand shipped in from another company plant. Electric vibrators speed up flow from hoppered bin to short belt conveyor. Left: Two short belts blend sand from plant to loading belt conveyor

Measurement of

BLASTING EFFICIENCY

Seismograph used to measure vibration and for study of efficiency of timing in millisecond delay blasting

By HAROLD H. WHITE

THE USE OF THE SEISMOGRAPH in connection with blasting has been largely confined to the measurement of vibration effect and the calculation of forces transmitted by blasts to structures in the same general area.

Recordings offer much more information than this under competent analysis, for the manner in which the forces were distributed is written in the traces made by their impact at the seismograph station and the writings may be used for the correction of obvious errors in borehole arrangement.

It is generally recognized that disturbance of the earth outside of the immediate blasting area is an index of waste, and it may be said that under perfect conditions (not attainable in quarry blasting), there would be no external vibration because all of the energy produced would be consumed in the work of breaking rock.

The power cycle of an explosive reaction intended to perform work is not essentially different from that which takes place in an automobile engine or a steam turbine, where mechanical efficiency is raised by the use of high compression ratios or the harnessing of additional energy during the process of expansion. But in the case of the explosive reaction the means to utilize high compression and turn the tremendous forces of expansion into work have been little understood and consequently, we have been using the forces of initial impact alone, allowing the equally potent forces generated by the full expansion of the gases produced to waste through crevices in the rock, whereupon they manifest themselves in the form of noise and vibration.

With the first use of the new millisecond delay electric blasting caps, we were surprised to note a great improvement in the resultant noise and vibration, but much more so by the general increase in blasting efficiency, which clearly indicated progress in the effective use of available power.

That the increased efficiency of the system using millisecond delays is due to the conversion of energy available beyond the stage of initial impact, is evident by comparison of the results of similar blasts, one fired instantaneously and the other using millisecond delay primers. Any theory that this energy could be of service in the form of work after breakage of the rock structure can be disposed of by consideration of the ineffectiveness of an unconfined charge, or the well known effect of a charge placed behind loose material.

We must therefore conclude that millisecond delay action provides a new cycle of effect, wherein the first charge initiates a build up of pressure within the rock structure and the impact of the charge some thousandths of a second behind it provides a disintegrating action by striking at the moment that the formation is under stress.

As an illustration we may visualize the ease with which a bottle subjected to the internal pressure created by fermenting wine may be shattered by a small external force and also by the degree of disintegration of the bottle.

Consideration of the above reasoning indicates the necessity for confinement of the charges, which may be governed to some extent by the borehole arrangement and the stemming of the holes, to build the pressure to the point of the rock's utmost vulnerability.

It is unlikely that a standard delay timing would fulfill the ideal requirements of any two rock formations and the inherent variation in timing between powder fuses designed to fire at the same instant may be an important factor contributing to the success of millisecond delays under varying field conditions.

With the fast delay action fully understood, however, opportunity exists for the determination by experiment of the most effective delay period for maximum efficiency at any given operation.

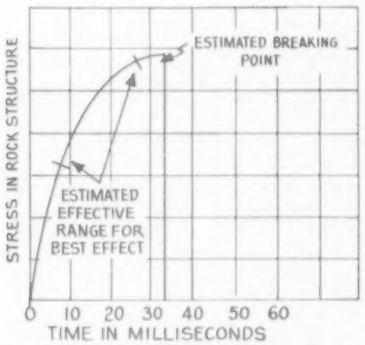

ESTIMATED BREAKING POINT
STRESS IN ROCK STRUCTURE
ESTIMATED EFFECTIVE RANGE FOR BEST EFFECT
0 10 20 30 40 50 60
TIME IN MILLISECONDS

Fig. 1: Curve showing points of most effective timing for millisecond blasting

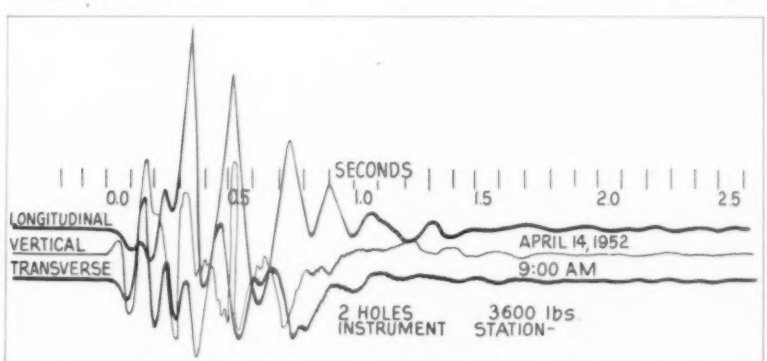


Fig. 2: Seismograph recording of blast showing effect of too much delay timing which, in this case, was 0.07 second. Note effect of double impact, to the left, recorded at seismograph station

Fig. 3: Seismograph station record of blast using four millisecond delays with less explosive and a reduction of 80 percent in vibration

Most Effective Timing

From the study of several thousand recordings of millisecond delay blast-

(Continued on page 204)

*General manager and consulting engineer, Vibration Engineering Co.

HOW PRODUCERS USE

MILLISECOND DELAY BLASTING

Savings in costs and improvements in over-all quarry operations summarized; loading patterns and safety provisions discussed for individual quarries

By BROR NORDBERG

DURING THE PAST FEW YEARS there has been remarkable progress in the application of millisecond delay blasting (often referred to as short interval blasting) throughout the entire quarrying industry. From the time, seven years ago, when it was first discovered that millisecond delay blasting improved fragmentation and reduced vibration, the quarrying industry, leading explosives manufacturers and seismologists have combined efforts to make the most of all its advantages. Much has been learned and it may be considered the outstanding quarry development in many years.

There still remain many difficult problems to solve in the application of millisecond delay blasting to individual quarries, which all differ in the problems they present, but progress has been very substantial and this type of blasting has become nearly standard practice. The benefits from reduced vibration were effective from the very beginning and have proved indispensable for that reason alone. Many complaints charging damage from blasting have been eliminated and many lawsuits have been averted or won because of the adoption of millisecond delay blasting to quarrying and because seismographic records of blasts came into wide use since 1946 and have been available as evidence. Restrictions limiting the use of explosives to ridiculous amounts per blast have also been overcome in most cases.

Progress continues to be made in reducing vibration but the other many advantages to the use of millisecond delay blasting are becoming more pronounced as experience is gained in applying the essential details required at each operation. These advantages include more effective use of the power of explosives, reduction in noise, better fragmentation, reduced drilling and explosives costs, decreased backbreak and control of throw for better quarry shovel operation. Millisecond delay blasting is a much more safe operation than it was at first, and compares very favorably in that regard with the less-complicated systems of instantaneous shooting formerly used.

It has provided a means of control over the phase of plant operation with the most variables and uncertainties, and where there was the greatest opportunity to reduce costs. It has, through better fragmentation, greatly minimized the problem of primary crusher hang-ups, very markedly reduced secondary drilling and blasting, reduced labor proportionately, cut maintenance of power shovels and primary crushers and, in many plants, has increased production as well. Cumulatively, these benefits are far more important than primary powder utilization, as such, in evaluating the economies derived.

Following a brief review and discussion of the basic principles and developments in methods of millisecond delay blasting, it is our purpose in this article to summarize the experiences of producers, their methods of application and results with many blasting arrangements. We also bring out some of the unsolved problems, and the special precautions against misfires and premature explosions from extraneous sources of electricity.

• THIS ARTICLE represents the first attempt to discuss industry-wide practice in the application of millisecond-delays to blasting, and to evaluate experience, on a quarry by quarry basis. Many quarry operators contributed detailed information in response to our request because they believe that an interchange of ideas is timely and may prove valuable.

It is our opinion that some of the safeguards in use, against misfires, cut-offs and premature explosions, deserve special study and that some of the safety methods, as described herein, may prove adaptable in other operations. As far as blasting methods and drilling patterns are concerned, it is impossible, and it could be dangerous, to generalize.

All quarries differ and present individual problems. For that reason, the characteristics of the individual rock formations have been described in each case where drilling and blasting methods are discussed. In that way, operators of quarries in rock formations similar in character to some we describe, may possibly draw some ideas from the methods currently in use.

Blasting is always potentially dangerous and we certainly would not advocate that any producer attempt to apply to his quarry, methods in use in any other quarry however similar the physical characteristics of the two formations and quarries. Should he think another's practice adaptable and worth trial in his own quarry, it would be in the interest of safety to consult first with the technical experts of explosives manufacturers. Detailed interchange of information between producers might also be desirable and we hope that ROCK PRODUCTS will be called upon to help in arranging an interchange of ideas.

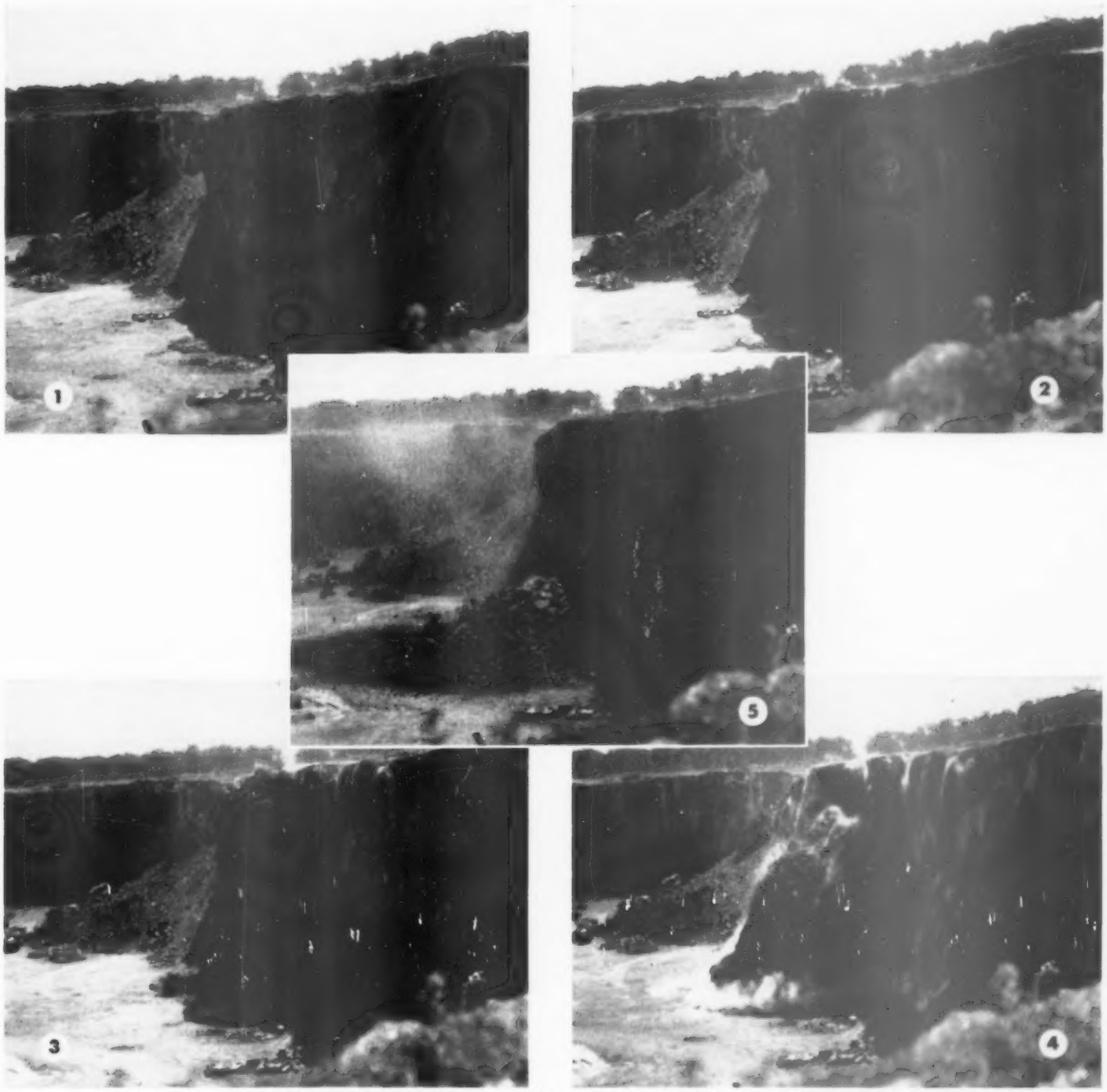
—THE EDITORS

Early Development

Shortly after the original discovery that short interval delay blasting reduced vibration and improved fragmentation, sequence delay firing with a mechanical electric switch was developed by Luther Miller of the New York Trap Rock Corp. Then followed a period of research in the development of timing switches among powder manufacturers and others, with emphasis on safety features for positive reliance against misfires. Many of these switches are in use in connection with primacord as we bring out later in this article.

Simultaneously, there was development underway in electric blasting caps in order to provide quarry operators with a larger choice of intervals to meet their special problems. They, too, are widely used either in connection with primacord or by themselves.

Two schools of thought prevail among powder manufacturers as to how best to accomplish short interval delay blasting. One prominent explosives manufacturer in particular advocates use of the electric blasting cap, preferably with bottom hole detonation, whereas some of the other prominent explosives manufacturers believe that primacord with surface detonation is preferable, particularly from the standpoint of safety. It is not our intent to advocate one method as against another in this article; rather, our emphasis is on what the producer of crushed stone has to say



Picture sequence of blast in eastern quarry, in which 10,000 lb. of explosive was detonated from bottom of three holes; quarry has 185-ft. face. Rockmaster 1, 2 and 3 delays were used

about his preferences and how he does his blasting. Quarry features restrict choice of methods in many quarries, regardless of preference for a method.

Fundamental Principles

For the benefit of those who are new in the industry or unfamiliar with the principles of short interval delay blasting, speed of dynamite had been considered essential to successful blasting up until 1946. In effect, high speed detonation of a row of holes actually resulted in serious backbreak, great vibration and noise, and had a tendency to push out large unbroken stone which required a great amount of secondary drilling and blasting.

In short interval delay blasting, adjoining holes, or rows of holes, are detonated a split second apart, as measured in milliseconds. While the stone is still under stress from the first detonation, the second detonation becomes effective in shooting stone through the curtain of stone first detached, to cause greater fragmentation. The entire face is put under stress by a series of detonations timed to accomplish least vibration and maximum breakage.

Optimum delay intervals depend on the breaking properties of a particular rock but the intervals seem to average from 15 or 16 milliseconds to 25 milliseconds in most applications as we summarize later. Some fast-breaking rocks like massive granite require a shorter interval. Stone of weaker character or which is to be processed for lime shaft kiln feed or riprap would require quick action, or that the burden and spacing be increased. There are all manner of variations to meet specific requirements.

The confinement of the gases while doing effective work has, in general, had the effect of permitting the use of increased hole spacing or reduction in amount of explosives. It dampens the noise which is usually confused with ground vibration, and reduces backbreak, likely because a line of weakness is created and the following holes tend to direct their explosive force to that line of weakness.

Through the use of millisecond delays, with proper hole spacing and burden and with the correct intervals,

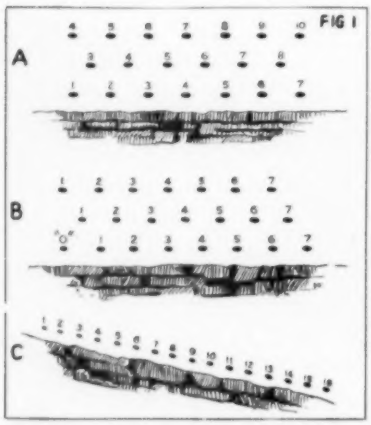


Fig. 1: Progressive methods of delay blasting using electric blasting caps: (A) for low-face quarries having an acute vibration problem; (B) for preventing excessive throw in situations with a free-parting at the toe, and (C) progressive series firing which often gives excellent results where reduction of vibration is the primary problem. Whether the firing order should be from left to right as shown or should be reversed will often depend on stratification of the rock. In many cases, method C will give more "toe" than is desirable, or more back break, because of planes of weakness in the rock. This figure, as well as Figs. 2 and 3, were taken from a recent publication of Atlas Powder Co. and are suggested methods used only as illustrations to show the flexibility of millisecond delay blasting in meeting differing conditions

it is possible to exercise considerable control over the shape and height of the muck pile. As a rule, the shorter the interval the greater the throw.

Those who advocate bottom hole detonation claim that, due to greater confinement of the gases, there is most effective fragmentation and that air blast is much reduced. They say that almost perfect confinement, and therefore maximum powder utilization, can follow proper loading and firing, which means the use of electric blasting caps in the hole. Others claim this to be unsafe practice and advocate surface detonation for all holes.

There are many theories as to how fragmentation and vibration are effected. It is fairly well proved that fragmentation is not ordinarily effected much by minor differences in the particular delay period used or particularly by the number of holes fired in a blast, at least above a certain minimum, but there definitely is a direct relation between vibration and breakage. A shot that produces minimum vibration always is a good shot from the standpoint of breakage. Vibration is believed related to the amount of explosive set off at a particular instant. It has also been proved by quarry operators that the longest delay does not necessarily give best fragmentation and the least vibration. Rather, there is an optimum delay period for each quarry. There are many instances when a shot of 12 or more holes produces far less vibration than a single or 2-hole blast in the same quarry.

It has been proved in some quarries that toe conditions may be related to the length of delay period but that relationship is not conclusive as yet. Where wiring is for detonation from the top, the time element must often be regulated so that the curtain of stone from the hole fired will not pull the wiring apart and cause cut-offs. In some few cases, the quarry face may have seams extremely far back which preclude the use of millisecond shooting in multiple rows, with surface initiation. In multiple row blasts, longer delay periods can be used, as a rule, between rows than with individual holes in a single row.

Experience has proved that the degree of accomplishment with millisecond delay blasting depends on the details in application. And that, for best results, the amount of explosive used must be close to the optimum or ideal.

Use of the seismograph and high-speed photography are proving invaluable in improving over-all results and in detecting faults in blasting that may be corrected by sometimes minor adjustment. The seismograph, through measuring vibration, is effectively applied in determining proper hole spacing and loading; the high-speed camera can reveal technical details of a blast. It will stop and show movement of the stone and it will disclose toe formation, misfires, premature escape of gases, the development of fragmentation and other important features. Some of our illustrations herewith were taken by a "machine gun" camera and supplied us by Atlas Powder Co.

Most producers prefer progressive shooting of holes or of rows of holes. In a single row there will usually be a single delay interval in sequence starting with the first hole to be detonated, thus peeling off the stone from one end to the other. In multiple rows, the first row might usually be shot instantaneously and the second will follow with a short time interval, the third will have a different delay period and so on. This method is considered particularly effective where vibration is a problem. There also can be delays between holes simultaneously, along with delayed shooting between rows in many combinations.

Comparatively recently, alternate firing has been introduced with electric blasting caps for bottom hole initiation of the charge. In the alternate pattern, each successive hole carries a different delay period, alternating the intervals, and the result is non-simultaneous shooting of adjacent holes. It is claimed that this system is effective in obtaining better displacement and less backbreak. Typical hook-ups for both alternate and progressive methods are shown in Figs. 1, 2 and 3 herewith.

As stated earlier, the principal recent development with delay electric blasting caps has been provision for more intervals for greater selection to suit a given quarry condition. For example, a leading manufacturer (Atlas) now has 17 different timings of detonators numbering from 0 (zero) for instantaneous firing through No. 16 which has a 550-millisecond delay period. No. 1 delay is 8 milliseconds, No. 2 is 25 milliseconds and the interval is in 25-millisecond increments through No. 9. Then the increments are 50 milliseconds. These detonators are fired the same as standard delay caps. When current is applied, the element of each detonator in the circuit is activated immediately and these elements control the split-second firing periods.

Other powder companies believe that surface initiation of primacord branch lines is preferable when practicable, through the use of a blasting timer for delay control.

For this type of surface firing, the outstanding development of recent

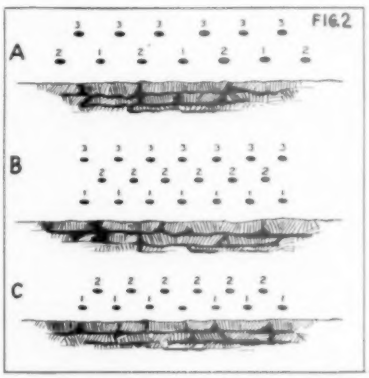


Fig. 2: Other progressive methods of delay blasting. (A) Double-row arrangement, common where breakage is the most important factor; (B) method used in quarries where multiple-row firing is necessary to get sufficient pile of rock, and (C) method frequently used to obtain maximum throw, at the same time taking advantage of increased breakage

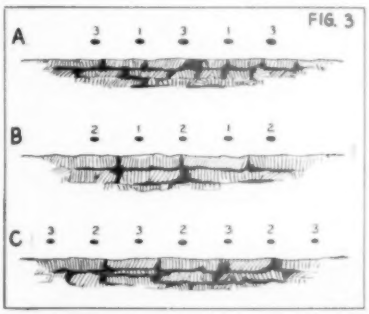


Fig. 3: Alternate methods of delay blasting. (A) For tough, spongy, resilient rock having considerable compressibility, a greater delay will "stretch" the rock to the limit with the first part of the blast before the impact of the second part is developed; (B) one of the simplest and often the most effective method for hard rock, and (C) modified arrangement, raising the periods one interval

years has been the du Pont primacord MS connector for short interval delay blasting, to take the place of electric caps.

These connectors have an average delay interval of 16-17 milliseconds, effected through a delay element contained in a ¼- x 2¾-in. copper tube. A 12-in. piece of primacord is attached to each end and held in place by a waterproof crimp. These two ends are spliced into the primacord trunk lines between holes to provide a number of intervals of delay. The connector is insensitive to stray electric currents and is essentially waterproofed. For sequence firing of a single row of holes, a double trunk line is preferred with a minimum of two connectors in parallel for each interval as a safety measure. The blast can be initiated at any point. Typical hook-ups are shown in Figs. 4, 5 and 6.

The foregoing is by way of introduction to a discussion of millisecond delay blasting experiences of individual producers, and an appraisal of results obtained and difficulties to be solved at individual quarries.

Most of the following is based on, or quoted from, letters received from producers of all types of crushed stone in reply to our request for participation in preparation of this article. Our letter was addressed to a list of qualified producers, seeking the benefit of their experiences and we urged that they present questions on the subject which we would attempt to have answered by others in the industry.

We realized, in asking participation of readers, that the subject of short interval delay blasting is a difficult, if not impossible, one on which to generalize, but we believe there is enough common ground that a discussion of certain practices and precautions could prove of practical value. Without a rather complete description of the stone formation and its characteristics, in each case, which influence blasting methods, any discussion on the subject would be meaningless, so we will endeavor to describe relevant characteristics of each formation before telling blasting details.

We will not identify the various operations by name or exact location because that is not important. Rather, should the type of stone and method in any operation discussed parallel or have unusual interest to others, we will endeavor to have more information made available upon request.

Our letter evidently struck a responsive chord. Many producers went to great length to answer our long list of questions which were designed to develop information which we believed basic to bringing out important points on the entire subject. It was indicated by many that there was great need for an interchange of information. Quite a few were frank in saying that they had little to contribute because of lack of experience with millisecond delay shooting.

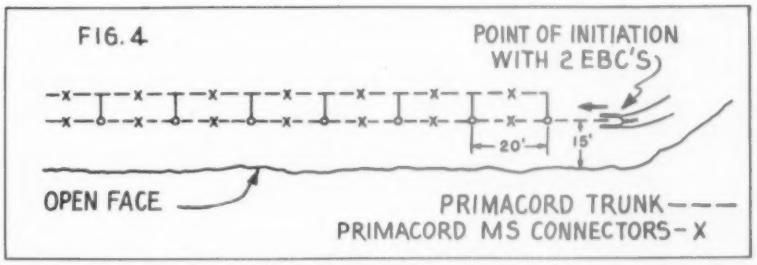


Fig. 4: Primacord MS delays for short interval delay blasting: A method for single row shot fired in sequence is shown here. This drawing and Figs. 5 and 6 were taken from Du Pont's "Blaster's Handbook"

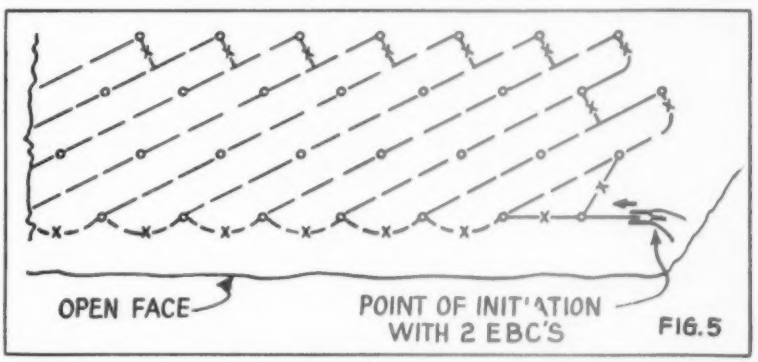


Fig. 5: Multiple row shot with holes and rows fired in sequence from one end using primacord MS connectors

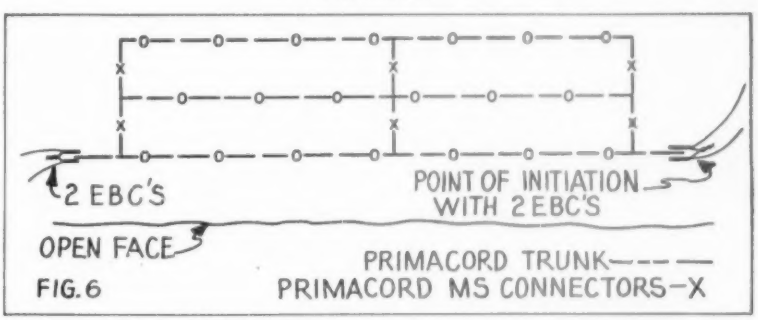


Fig. 6: Multiple row shot, entire rows in sequence using primacord MS connectors

Replies to our letter were from more than 25 states and Canada. Of the total, 31 percent came from cement manufacturers and the balance comprised producers of lime, limestone, trap rock, granite, quartzite, dolomite, sandstone, silica and rock asphalt. Several drawings of shot layouts submitted are shown in Figs. 7, 8 and 9. Less than five percent of the total are not using short interval delay blasting and the reasons given have no bearing on any comparison with instantaneous shooting.

Our questions and suggested items for discussion were the following:

1. Brief description of deposit characteristics which influence blasting methods.
2. Height of face.
3. Spacing and burden of primary blast holes (single or multiple rows?).
4. Number of holes fired for best results.
5. Optimum delay period.
6. Do you use electric caps or primacord and switch? Why?
7. If electric caps, is detonation initiated at bottom or top and why?
8. If primacord, are delays between holes used?
9. Is progressive or alternate shooting of holes preferred and why?
10. How do you drill and blast to minimize toes?
11. Effect on production and decrease in secondary breaking.
12. Powder factor as compared with instantaneous shooting.
13. Effects on vibration, backbreak, control of throw.
14. Savings in costs and other benefits.
15. Do you use deck charges and use delays in horizontal holes or for block-hole shooting?
16. Any difficulties from misfires and from cut-offs (A) with primacord, (B) with primacord connectors,

(C) with timing switch, (D) with fast delay caps?

17. Special precautions against premature blasting from extraneous blasting circuits.

18. Do you use the seismograph and services of outside experts?

19. What are your experiences with cut-offs in holes using millisecond delay blasting as compared to instantaneous blasting?

In our summary of experiences and results we have generalized somewhat but details as to methods and experiences are covered separately for each quarry so that reasons may be interpreted according to quarry characteristics. Manufacturers of explosives and blasting supplies are identified only where mentioned by name. All of them have had their part in this development.

Types of Quarries

Represented in the quarries are deposits that are badly pitched and broken up with seams and jointing. Some have uneven surfaces, partings, laminations of every description, clay seams, vertical seams and great variations in bedding thicknesses. Others are massive without jointing or cleavage planes, some vary in solidity, others are soft and of spongy or porous character. There are those with alternate hard and softer levels of variable toughness, a few with hard cap rock, those with clay pockets and some that do not have a tendency to carry fracture. There are granites that tend to break off in blocks, while some formations have definite partings that make it simple to develop a floor. Nearness to residential areas and other restrictions have a bearing in methods of blasting at several of the quarries.

Quarry Faces

Face heights represented range from as low as seven feet up to a high of a 210 ft. face which is drilled by rotary drill to its entire height. Most faces below 25 or 30 ft. in height are drilled with pneumatic equipment, both wagon drills and jackhammers. Some faces higher than 40 or 50 ft. are drilled in benches and the majority of well drill holes are about 6 in. A few of the larger capacity plants use 9-in. blast holes and a 10-in. hole is used in a rock asphalt quarry. Several have Quarrymaster and rotary drills; one is diamond drilling 1½- and 2-in. vertical holes in a hard, tough trap rock; and jet piercing is employed in a granite quarry with a 100-ft. face.

Hole Spacing

As far as drilling pattern is concerned there are all spacings and burdens represented, from 4 x 4 ft. up to 30-ft. spacing by 25-ft. burden in two cement company quarries. The latter are 9-in. holes with 63-ft. and 80-ft. faces. In most cases the spacing exceeds the burden by a foot or more and, generally speaking, the spacings and the burden are greater than was used formerly with instantaneous blasting. With more control over blasting due to the use of millisecond delays, there apparently are more variations employed in the drilling pattern as well as in choice of delay intervals, to suit special conditions, in order to vary the production of fines according to requirements, to attain blending in some deposits and for other reasons. Slower delay intervals and wider spacing of holes are effective controls where shaft kiln feed stone and riprap are produced.

Single vs. Multiple Row Shooting

Thirty-eight percent of those who supplied us with information are using multiple row blasting and the balance single row. Most of those with multiple rows use two or three rows and have relatively low faces. In one case, from 6 to 10 rows are shot in sequence with delays. As high as six or eight rows have been tried in other quarries but abandoned because too many toes resulted, or the shot left ridges in the floor between rows. The holes are staggered in the majority of multiple row patterns and the sequence in most quarries consists of the use of delays between rows with all holes in each row detonated simultaneously.

Numbers of Holes Fired

Numbers of holes fired per primary shot average higher than they did with instantaneous shooting, for a number of reasons. Where local conditions have limited the size of shot because of complaints or alleged damage from blasting vibrations, operators of quarries have been able to increase the size of blasts with the use of millisecond delay intervals. In many such cases, the seismograph has proved to complainants and to local officials that vibrations are markedly reduced when larger numbers of holes are shot in a single blast.

There are far more than a few instances where eight, ten or even fifteen and more well drill holes are fired in a single blast where there had been a limitation to a single hole with instantaneous blasting. This has proved extremely important to increased production.

It was brought out at the 1952 convention of the National Crushed Stone Association that a minimum of eight large diameter holes should be fired in sequence for minimum vibration, and that fact is fairly well substantiated by our findings. Less vibration means, of course, that there is more effective powder utilization and the industry has accordingly found out that large blasts can be economical practice.

Our study has revealed that as many as 300 holes are being fired in a single blast, where the faces are below 24 ft. in height and drilled with pneumatic equipment. The number of well drill holes fired in a single shot varies so much with hole size, type of rock and drilling pattern that it is impossible to generalize. One of the largest limestone quarries in the country, located in an isolated area, fires as many as 400 well drill holes in a blast. They are 6-in. holes, fired in two rows. Burden is 25 ft. for the front row and 20 ft. for the back row with spacings of 15 to 18 ft. Working faces vary from 30 to 50 ft. in height.

Where plants are in densely populated areas, the sizes of blasts continue to be held down in some instances because of complaints or fear of opposition. At other quarries, physical restrictions necessarily prohibit maximum effective use of millisecond blasting.

Delay Periods

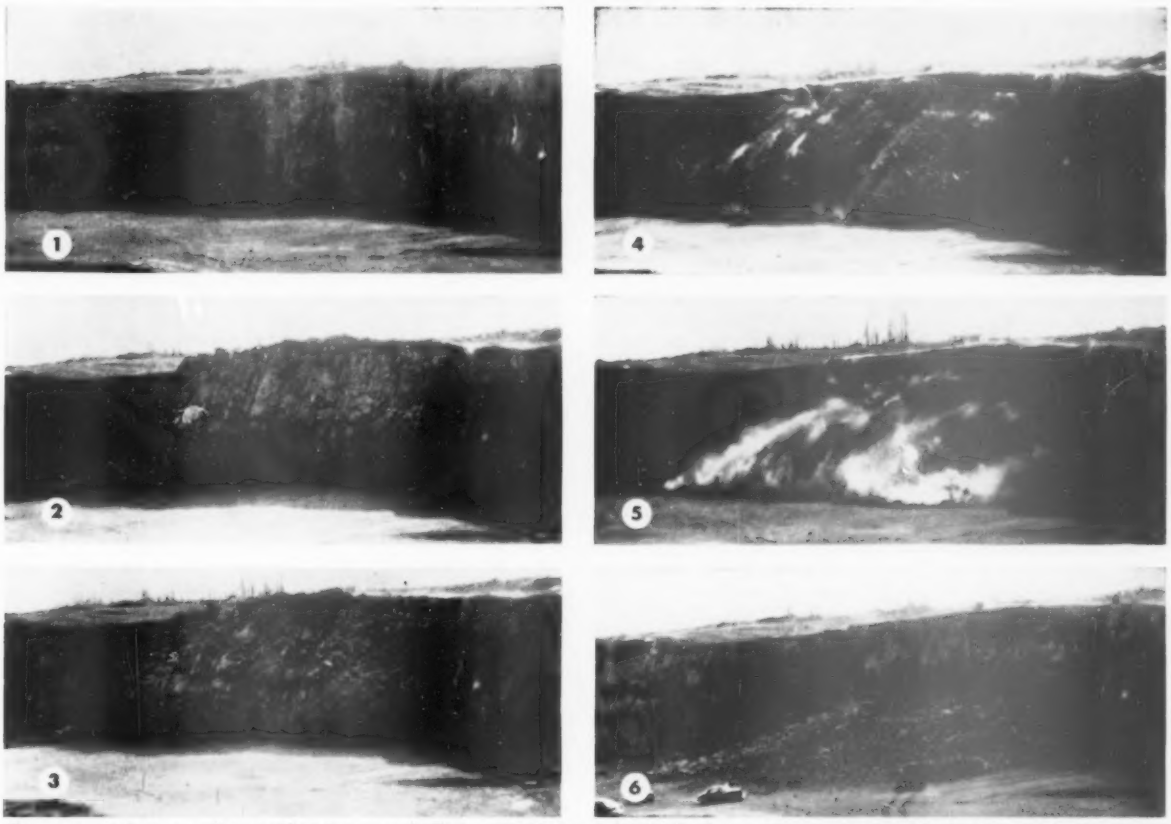
It is believed by some experts that the optimum delay period cannot be standardized for all quarries, and that there is a best interval for each depending upon rock characteristics and other variables. Whereas a 25-millisecond interval between delays, with electric caps, seems to be one of the most commonly used and available, there are examples of alternate selections of delays to accomplish more nearly the desired intervals. For example, where a quarry used 25-, 50- and 75-millisecond delay caps for three-row shooting in sequence, lengthening the interval out to the use of 25-, 75- and 125-millisecond delay caps has resulted in much better fragmentation, with a slow moving rock.

In a granite quarry where best breakage would be obtained with a delay period of approximately 25 milliseconds, the speedy movement of the rock after detonation has made it necessary to use a much shorter delay period.

Where primacord MS connectors are used with primacord trunk lines, the delay period is established at intervals of 17 milliseconds by the cartridge.

Caps vs. Primacord

It is impossible to draw definite conclusions as to preference between the use of electric caps or primacord and switch for short interval delay blasting. Many producers who use large vertical blast holes prefer surface detonation with primacord mainly because they consider it safer against premature explosion from lightning or other extraneous sources of electricity. The comparatively recent development of the primacord MS connector was to eliminate the use of electric blasting caps even for surface detonation and has proved of interest to those producers fearing cut-offs. Quite a few quarries are using these connectors and undoubtedly more will continue to



This sequence shows an alternate blast in trap rock. There were 11 6-in. holes 65 ft. deep, with an average 18-ft. burden and 20-ft. spacing; 48-lb. of Giant gelatin were used for a powder factor of 4.53 tons per pound of explosive. Rockmaster 3 and 4 delays were alternated and placed in the bottom of the holes. A progressively fired shot in the same quarry showed more vibration and gave poorer fragmentation

be used. However, electric blasting caps are also widely used for surface detonation with primacord. Cap and fuse are also used.

Both primacord and switch, and electric blasting caps, are used by some quarry operators, and electric blasting caps are used exclusively for some of the high face as well as many of the low face quarries. Electric blasting caps are chosen in low face quarries with small holes, for economy, ease in hook-up and flexibility. Many of them are in use for bottom-hole detonation and, in particular, where toes are a problem. An interesting application is the use of electric blasting caps for alternate detonation of adjacent holes, using top and bottom initiation, in the successful elimination of toes. Heavy bottom loading and detonation at the bottom of holes is generally the practice where electric blasting caps are used and where there is tendency to toe formation.

More than one-half of the quarries covered in our study use primacord and switch for blasting. Some 40 percent use electric blasting caps for short interval delay blasting, of which the majority are for bottom hole detonation. A considerable number of electric caps are also used for initiation with primacord hook-ups. These figures are just from our sample and are not representative because replies were lacking from areas where the types of deposits might dictate the use of one type or the other uniformly throughout the areas.

As far as choice of blasting method is concerned, it would seem from reading the many letters received that economics and physical properties of the stone and face have greatest bearing. There was little evidence of misfires, and relatively few incidents of serious cut-offs of wiring were reported.

Progressive vs. Alternate Shooting

Progressive or sequence firing is the most accepted method of blasting, whether in single row or multiple row shooting. According to our letters alternate shooting, whereby adjacent holes have a different delay period, is of recent introduction and less information is available on this practice. At least, some producers did not understand our question on that score. It is claimed that, in general, progressive shooting tends to leave a cleaner face and be more adaptable to the movement of stone from tight corners. Supposedly, it is best for low muck piles.

Companies which use both methods make their decision according to needs. One quarry uses progressive shooting for close hole spacing to produce a maximum of fines, using alternate shooting with wider spacing for fewer fines. One company uses a combination of both methods in a single row and reports more uniform fragmentation as a result.

Toes

At approximately 70 percent of the quarries, blast holes are drilled below the quarry floor in order to minimize toes. The average is about two feet for low faces and ranges from four or five up to seven feet for large holes and for faces exceeding 50 ft. One quarry drills ten feet below the quarry floor. Toes continue to be a serious problem for some producers regardless of depth of drilling while others have excellent results from subgrade drilling. Where there is a clear parting at the floor, there is no problem and drilling to grade is sometimes sufficient.

Bottom hole horizontal drilling, or under-cutting, helps in certain instances. Heavy concentration of explosive in the bottom of the hole is another way to minimize toes which means that larger diameter holes for more concentration of the powder might be desirable. Higher speed pow-

ders are used for the purpose as well. Attempting to shoot with too much burden undoubtedly is a factor, so hole spacing and burden must be closely watched and attention be paid to good clean-up before each shot.

Benefits

The effect on production and the amount of secondary breaking required, as the result of millisecond delay blasting of primary holes, was reported as very favorable. Amount of secondary breaking has been sharply reduced for the majority. The amount ranges from 25 to 95 percent less, with an average possibly of 60-70 percent. Secondary breaking has even been cut out entirely in a few quarries. A more uniform muck pile was reported by many and, through control of size of stone, a number of quarries have increased shovel loading and primary crusher output. Hang-ups in crushers have been reduced where that was a problem, and substantial savings were reported in labor and maintenance of power shovels and primary breakers. About five percent who claimed no reduction in secondary breaking still considered experience favorable because of control of blasting and safety.

Powder Factor

In comparing powder factor with that for instantaneous blasting, 50 percent reported that consumption was the same, whereas 30 percent claim savings in powder for primary shots. Of the remainder, several reported greater powder consumption and the rest said that over-all powder use was the same. In our opinion, most of those reporting savings were speaking in terms of total powder consumption. Generally, it takes less powder to blast down a face which would result in many blocks requiring secondary drilling, than to have a blast (millisecond) which is more effective in fragmentation but which, on the other hand, requires little or no secondary blasting. The savings in secondary blasting and attendant labor far offset any increase in powder for primary blasts. Any fair comparison should consider total cost in delivering stone into the plant.

Between 85 and 90 percent reported greatly reduced vibration accompanied by less backbreak and by good control of throw. Among the savings and benefits listed by the 96 percent of the producers who reported favorable experience were reduction in labor for secondary drilling, less end hole losses, better shovel dragging, more stone by-passing the crusher grizzly, reduced maintenance on loading equipment and reduced dozer operation for clean-up of the quarry floor. Those with track haulage believe that greater control of throw is the greatest benefit.

A few say that the expense for electric blasting caps offsets savings in powder, and they are contemplating larger and deeper blast holes as a result. Seventeen percent are using deck charges. One producer reported the use of delays in block-holing with mud caps.

Misfires

More than 60 percent of the producers said that they have had no difficulties with misfires or cut-offs, presumably since millisecond delay blasting became standard practice. Of those who have had the problem, there were one or two incidents of difficulties as a rule and that because of mechanical failures in switches, electrical troubles or as the result of earth movement cutting primacord. Cut-offs due to bed slippage have occurred on occasion where initiation has been part way down a hole or, with surface detonation, usually at the far end of the hook-up. A great deal of care is being taken to prevent the occurrence and the industry obviously has been successful in making its blasting operations much safer than they had been in years past. We asked for comment on special precautions against premature blasting from extraneous blasting circuits. The most common practice is to avoid loading of holes, wiring and blasting when there is static in the air. Some producers do a thorough job of checking switches and current, others cover exposed cap wires, some load holes only during fair weather, and many use grounds and shunts as safeguards, the use of which are discussed in describing practices in the individual quarries. A few take special precautions to keep mobile radio-sending equipment away from blasting areas.

There has been much publicity on the possibility that electric blasting caps can be exploded by radio waves from transmitters. These waves might emanate from AM or FM radio stations, television stations, amateur sending sets and from 2-way communication systems. The theory is that the wires of an electric blasting cap would act as antennae and pick up radio energy under certain ideal conditions. Evidently, the possibility is very remote (no record of such occurrence in a quarry) but nevertheless is being considered by the more cautious in their blasting operations. Blasting is of course always potentially dangerous so it might be wise to do as some report and keep mobile radio equipment out of the blasting area.

Some of the larger producers regularly use seismographs and the services of seismologists to record vibration from all primary blasts, and others use them occasionally but the majority do not except in isloated cases of complaints. A good number seek technical advice from their supplier of explosives and, in a few cases, such supplier is called upon to supervise each primary blast.

The following covers the methods and experiences of part of the individual quarry operators who supplied information, with a brief description of the deposit characteristics in each case. Each operation carries a number for convenience in case readers wish to request added information.

Limestone with Horizontal Beds and Shale Partings—(1)

This quarry is operated by a cement manufacturer in Canada. The limestone is in flat, horizontal beds up to 3-ft. thickness, separated by shale partings. Normal drilling practice in 1950 consisted of 9-in. blast holes spaced 25 ft. apart and with a 22-ft. burden. The holes were loaded with 50 percent and 75 percent Dynamex, using the du Pont timer and primacord. The use of Nitramon was started in 1952 and the spacing is now 30 ft. with 25-ft. burden. Recently the timer was replaced with primacord MS connectors.

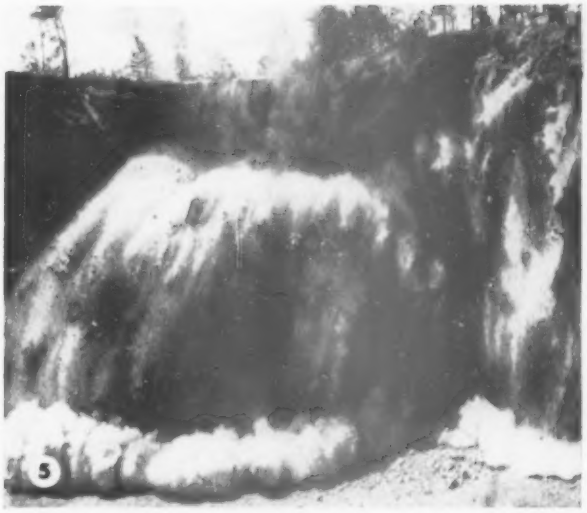
Height of face averages 63 ft. and from 8 to 15 holes are fired in a single row, which range gives best results. The delay period is the 17-millisecond interval provided by the connectors. With the timer, the period was 20 milliseconds. MS connectors are preferred because they are easy to hook up, and because they are simple to use with an additional safety trunk line.

Holes are fired progressively, starting from one end or the other depending on the profile of the face and the cleavage. Holes are drilled 2 to 3 ft. sub-grade to minimize toes. Production rate has been improved mainly due to a decrease of 50 percent in secondary blasting. The saving which normally would result from millisecond delay blasting is taken up largely by better fragmentation rather than in improved powder factor. Increased burden and spacing plus the use of Nitramon have, however, resulted in improved powder factor.

Complaints due to vibration have been eliminated, due in part also to covering of the exposed primacord, blasting when the wind is away from built-up areas and because no blasting is done at noon and during holidays. Use of MS connectors has reduced the number of men required to load a shot. No decking is used but 20 ft. of stemming is placed at the top of each hole.

Laminated Limestone—(2)

This is one of many quarries operated by a large midwestern crushed stone producer. Thirty-eight feet of limestone with 6- to 18-in. thick ledges is being worked. Drilling is with wagon drills, 18 ft. of stone to the lift and bottoming the holes at 2 in. Spacing is 4 x 8 ft., and best breakage is with four rows. With one or two rows, the fragmentation is much poorer. An average shot is 75 holes to yield 3500 tons of stone. Larger shots, up to 125 holes, may be shot satisfactorily.



This 6-hole shot was fired using primacord with timer. Holes were detonated from the top. Spacing was 23 ft., burden 20 ft., depth of holes 155 ft., and 11,600 lb. of explosives were used

Methods and experience were described as follows:

"We use electric caps entirely for our primary shooting, the reason being that we do not deck our holes since they are small ones, bottomed out at 2 in. Primacord would be expensive and require more time for loading. I think it is generally accepted by the industry that in shooting wagon drill holes, electric caps are the most economical to use. We put our electric caps within 18 in. of the bottom of the holes, the reason being that we believe we get better results because we have a rather hard floor to hold.

"We have found by using a little faster powder in the bottom of the holes for the first 24 in. and placing the cap in it, that it gives us more power in the bottom where we need it most. Experience has taught us that this loading in this particular quarry gives us the best results. However, there are many quarries where we do not have a hard bottom to pull; the stone is uniform throughout the face and in that case it is not necessary to use a faster powder in the bottom of the holes, and it would not make any difference whether or not caps were put in the bottom or farther up.

"Since we have a very low face, we use the alternate system of shooting holes as we wish to keep our stone concentrated and piled up as much as possible. Also, we feel that we get slightly better breakage that way. We have tried both ways and find that the alternate system gives us best breakage. In quarries where larger holes are used and a high face, and where the operator wishes to have his stone scattered out so the muck pile does not get too high, which would cause a shovel hazard, the progressive method of shooting is, without doubt, preferable.

"We have been using the delay shooting system for the past four or five years and by so doing have eliminated, probably, as much as 75 percent of our secondary shooting. This, in turn, has increased our primary production. Although we do not have records to indicate how much we have increased our primary production, I think a fair estimate would be approximately 20 percent. By delay shooting we have reduced our powder cost by 25 percent. In quarries where we have taken seismograph tests of the vibration, we have been able to shoot three times as many pounds of powder in one shot as we did with instantaneous detonating and still experience less vibration.

"I might relate to you one case when we made an experiment with well drill holes. We had less vibration shooting five holes than we did shooting one hole and we had less vibration shooting seven holes than we did shooting five holes. In this particular case we used a timer and slight delay between each hole fired. We do not use any deck loads because we find we get better breakage by loading straight up through the hole within 36 in. of the top and by controlling the amount of powder that we have in a given area by our hole spacing, and the size of the holes. Some quarries have some very thinly laminated areas in the face and in cases such as these, deck loading is often advantageous. If you do not have such a condition, it is more economical to get your hole spacing arranged in such a way that you can fill the hole full of powder and thereby avoid wasting drilling energy.

"We have not experienced trouble for a long time with misfires or cut-offs. About a year ago, we had some trouble, but found that all we needed to correct it was an educational campaign—teaching our men to use the utmost care in wiring shots and rechecking to make certain they are wired correctly and properly, as well as a periodic check of our batteries to make sure they are in first class condition.

"In reference to precautions against premature shots, we do not permit our men to work on the ledge if it is loaded during an electrical storm, nor do any loading during periods such as these. Neither do we permit the shots to be wired until we are ready to detonate the shot. Another rule we have is that the wire that is used for firing the shot must be carried down upon the ledge, hooked on to the shot, and then rolled out to the point from where the shot is to be fired. This, however, is not done until men are removed from the ledge.

"On many occasions we have used the service of seismograph experts and have found them most helpful. Often we have been blamed for damage to buildings, such as broken windows, cracked plaster and building foundations, and on each occasion by having seismograph tests taken, we have proved these claims to be false.

"To help in determining the size of the shots, how many holes, and what amount of powder can be safely fired without creating excessive vibration, we have found that services rendered by representatives of powder manufacturers have been very helpful. They do considerable research in developing new ideas, and because they travel around the country visiting all the operators in a territory, they have the opportunity to accumulate information, which the average operator does not have.

"In our type of blasting, we have not experienced any trouble with cut-offs because of the millisecond delay blasting cap. Sometimes we thought we had cut-offs, but usually we were able to eliminate any unexploded holes by making certain that each shot was carefully wired and properly prepared before firing."

Badly Pitched Limestone Deposit—(3)

This quarry is operated by a cement manufacturer in the south and is one of the most difficult formations to work that we have seen anywhere. It is not only badly pitched but is so broken up that any type of drilling is difficult.

Well drills were first used back in 1928 but were quickly discarded due to high cost, and jackhammers and wagon drills are now in use.

Quarry faces vary from 12 to 100 ft., and the low faces and bottom holes of the high faces are drilled horizontally with wagon drills. The high faces are benched and drilled with jackhammers, maximum length of jackhammer steel being 12 ft. Spacing and burden varies but averages about 6 x 6 ft. Likewise, the number of holes fired per shot varies, with an average of 90. Electric blasting caps are used for economy and convenience and the delay periods are No. 1, No. 2 and No. 3. Detonation is at the middle of the holes for best breakage and the pattern is progessive shooting. Horizontal drill holes for the bottom of high faces, and for all low faces, is the approach to minimizing toes.

Millisecond delay blasting gives much improved breakage but there is no noticeable improvement in powder factor. Vibration, while not a problem, is much less and it is not practical to measure the effects on throw or backbreak. Deck charges are not in use. Delays are used in horizontal holes.

Soft Limestone—(4)

This quarry is in Tennessee. A face of 30 ft. is blasted, with a double row of from 20 to 30 holes. Spacing is 6 x 15 ft., and 25- and 75-millisecond delay intervals are used. Both electric caps and primacord with switch are used at this quarry. With electric caps, bottom detonation is preferred in order to reduce backbreak and for improved fragmentation. With primacord, evidently used where decking is required, there are short interval delays between holes. A progressive pattern is followed to relieve the burden. Holding down the burden and careful clean-up of the preceding shot are the precautions taken to minimize toes.

Vibration and backbreak are markedly reduced and control of throw is considered favorable. Powder factor is reduced, and there is a 10 percent saving in blasting costs. There have been no difficulties from misfires and cut-offs with primacord. For safety, work is stopped at the approach of electric storms and all exposed cap wires are covered.

Limestone with Three Variable Strata—(5)

Illustrated in Fig. 7 is the blasting

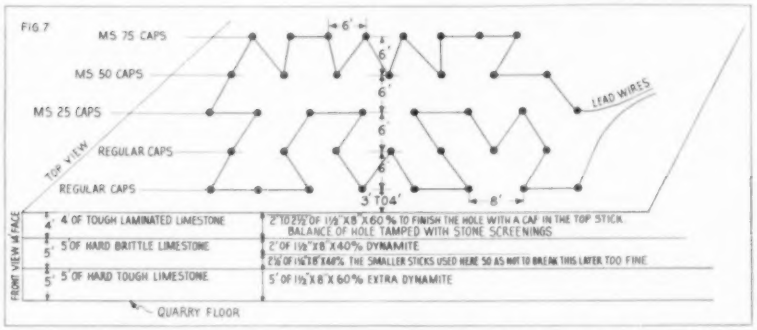


FIG.7
MS 75 CAPS
MS 50 CAPS
MS 25 CAPS
REGULAR CAPS
REGULAR CAPS
TOP VIEW
LEAD WIRES
6'
6'
6'
6'
3' TO 4'
8'
FRONT VIEW of FACE
4' OF TOUGH LAMINATED LIMESTONE
5' OF HARD BRITTLE LIMESTONE
5' OF HARD TOUGH LIMESTONE
2' TO 2½' OF 1½" X 8' X 60 % TO FINISH THE HOLE WITH A CAP IN THE TOP STICK
BALANCE OF HOLE TAMPED WITH STONE SCREENINGS
2' OF 1½" X 8' X 40% DYNAMITE
2½' OF 1½" X 8' X 40% THE SMALLER STICKS USED HERE SO AS NOT TO BREAK THIS LAYER TOO FINE
5' OF 1½" X 8' X 60% EXTRA DYNAMITE
QUARRY FLOOR

Fig. 7: Multiple row shot in a laminated limestone quarry, in which a well-slanted cut off is used in place of a square one since this lets the blast come out of the face more easily and gives less backbreakage

pattern for 5-row shooting in a midwestern quarry with a 14 ft. height of face which has stone of three distinct characteristics. Spacing is 8 ft. and burden between rows is 6 ft., burden being 3 to 4 ft. for the front row. The first two rows are fired with instantaneous caps followed, consecutively, by intervals of 25, 50 and 75 milliseconds. A well-slanted cut-off instead of a square one is effective in permitting the blast to come away from the face in reducing backbreak.

This producer has been using short interval delay blasting for one year and has eliminated complaints from nearby farmers.

Delay caps are also used in blasting large boulders with mud-caps. When using regular caps for the purpose there were many complaints when blasting 15 such boulders. Thirty-two boulders are now blasted with far fewer complaints. Eight of them have regular caps, eight have 25-millisecond delays, a third group has 50-millisecond delays, and the fourth a 75-millisecond period.

Highly Variable Jointed Limestone—(6)

This quarry is located just outside Philadelphia, Penn., and is adjacent to a 50,000-watt radio broadcasting station, which is a factor in following blasting procedures for utmost safety. The deposit varies widely in different parts of the quarry. Due to wide differences in the solidity of the deposit, the presence of numerous natural partings and joints, and a boulder-like residual dolomite in the many clay pockets or re-entrances into the upper surface of the limestone, problems must be met individually and there are variations in procedure.

Height of face ranges from 22 to 70 ft. Experience has proved that a minimum of 7 or 8 holes yields best results, using progressive hook-up with 17-millisecond delay period. Holes are spaced 15 to 16 ft. with 20-ft. burden on the high face, and the spacing is 15 x 15 ft. for the lower face. All large diameter blast holes are loaded with Nitramon and Nitramex blasting agents, and primacord and Nitramon primers are used to detonate the column of explosives—top, bottom and center. Primacord MS connectors, 17-millisecond delay, are used between holes. Powder factor is much better than with the old, instantaneous method. Backbreak is about the same as it was, also control of throw. Six inch primary holes are drilled six feet below the quarry floor.

Small diameter, pneumatic-drilled holes are charged with special gelatin dynamite that is detonated by primacord which is initiated with caps and fuse.

No misfires or cut-offs have been experienced but special care on hole spacing is exercised to prevent such occurrence. The operator of this quarry considers his safety factor to be 100 percent. Company engineers make shock recordings of each blast, and all blasting is done by du Pont representatives.

Lehigh Valley Cement Rock—(7)

This stone has flat-lying strata with 6 to 15 ft. of clay and shale overburden. The present quarry has been worked about four years and the face has developed from 20 to 100 ft. in height as work progressed into a hill. Face length is now 300 ft. When the quarry was started, ten and 12 holes were blasted at a time using Rockmaster millisecond delay caps in an alternating pattern with a 50-millisecond interval. This proved superior to the primacord method used in the old quarry as to breakage, toe removal and vibration. Dynamite costs were reduced 25 percent and secondary reduction was practically eliminated.

Face height now varies from 85 to 100 ft. and a single row of holes with 26-ft. spacing and 22-ft. burden is now being fired, using 25-millisecond Rockmaster electric caps. The progressive method was adopted for reduction of vibration and control of direction of throw, with bottom hole detonation for complete confinement of gases. Development of the present method was summarized in the following paragraph from the producer's letter:

"When the height of the face reached 75 ft., some mild vibration complaints were registered from the nearby town. It was then agreed that our shots would be limited to four holes and the Rockmaster pattern was changed to a straight progression of 8, 25, 50 and 75 milliseconds. This change necessitated some experimentation with the drilling pattern and the eventual pattern netted a factor of four tons of rock to the pound of dynamite with little increase in the amount of secondary blasting and no change in the excellent toe removal. I can say confidently that we have not had any toe problem since this quarry has been using bottom hole priming with the Rockmaster millisecond delay system. When the final change in drill pattern was made, we found that one well drill was ample for our operation and we were able to dispose of our second well drill and use the drill crew for other purposes."

Drilling is carried 7 ft. below the quarry and bottom detonation is used to minimize toes.

Dynamite costs have been reduced, and there have been savings in costs for maintenance of shovels, crushers and in labor for toe removal. Secondary blasting has been almost eliminated and backbreak has been cut out almost completely.

There have been no misfires or cut-offs with bottom-hole shooting. Caps remain shunted while drilling is in progress. Tests are made of all wires with milliammeter to detect stray currents.

Highly Fractured Quartzite—(8)

In a highly fractured quartzite deposit of extremely hard rock, wagon drill holes are spaced 8 x 8 ft. in drilling a 20- to 24-foot face. From 200 to 300 holes are blasted with a 25-millisecond interval, with the same period for each line of holes. Delay electric caps are used for their flexibility and detonation is initiated near the middle of the hole, high enough in order to reduce abrasion of the leg wires. The shot is progressive, in rows, and no toes have been experienced by exercising accurate control of the burden. A slightly reduced powder factor has resulted, and a cost saving of 25 percent when compared to instantaneous blasting. Loading is in solid columns and there have been no difficulties with misfires and cut-offs. Circuits are shorted prior to final hook-up as a safeguard.

Limestone with Variable Strata—(9)

This formation of high calcium limestone is being worked on a 50- to 55-ft. face which will soon be increased to 70 ft. In the old method of blasting, with primacord detonated with electric cap, the spacing was 10 x 12 ft., in shooting ten to 16 holes. There was considerable secondary breaking required, heavy concussion

and the yield was 3.25-3.5 tons per lb. of explosive. The company has since developed its own blasting machine for millisecond delay blasting, which is being patented. Spacing of holes has been increased to 15 x 15 ft. and the yield ratio has been increased to 5-5½ tons per lb. of explosive. There is practically no secondary breaking required and concussion has been nearly eliminated.

Number of holes is held to a minimum of 12 but it is felt that the number makes no difference in results. Optimum delay period is 1/150 second and each hole is connected to the firing machine with an electric cap attached to primacord. The machine is wired for 550 volts. Delays are used between the holes and firing is in sequence. Drilling is from 3 to 10 ft. below grade and no trouble is experienced with toes.

There is very little backbreak, and control of throw is considered good. Cost for primary and secondary breaking has been nearly cut in half. As far as cut-offs are concerned, a hole is occasionally lost if the operator is careless with the primacord. The machine is grounded until all is in readiness for the shot.

Laminated Limestone—(10)

A very unique system of blasting is practiced in the limestone quarry in Ohio with 24-ft. face, using liquid oxygen for primary shots. A profile of the face and the drilling pattern are illustrated herewith. The description of practice and the experiences are as follows:

"Millisecond delay blasting has been practiced at our quarry for some years to minimize vibration, noise and achieve better fragmentation of the limestone with less secondary blasting.

"Drilling of this limestone deposit is done with a vertical air drill. An interesting feature of this drill is that it was designed and built in our own shop. The drill (illustrated herewith) is mounted on rubber tires with a truck steering mechanism. An air motor is used for propelling from hole to hole or to move to a safe distance for blasting. The mast is 30 ft. high, mounted with an Ingersoll-Rand Model X-71-WD wagon-mounted air hammer. The mast is hinged in the middle to allow the drill to be transported from quarry to quarry without being top heavy and to get under power and telephone lines. The hammer is lowered and raised by means of an air brake on the cable drum. Holes are drilled 24 ft. deep, but drill stems are 25 ft. long, 1½ in. in diameter, using a 4-in. bit. The extra length of drill stem is needed to allow for reconditioning from breakage in the threads. One man operates this drill, drilling approximately 21 ft. an hour.

"Two rows of holes, parallel with the face, are drilled and shot at one time (see Fig. 8). The first row of

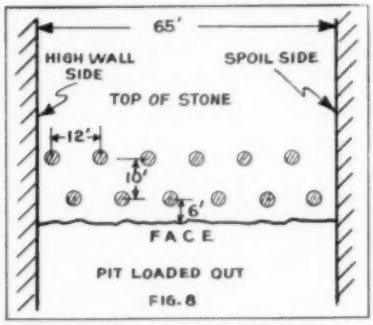
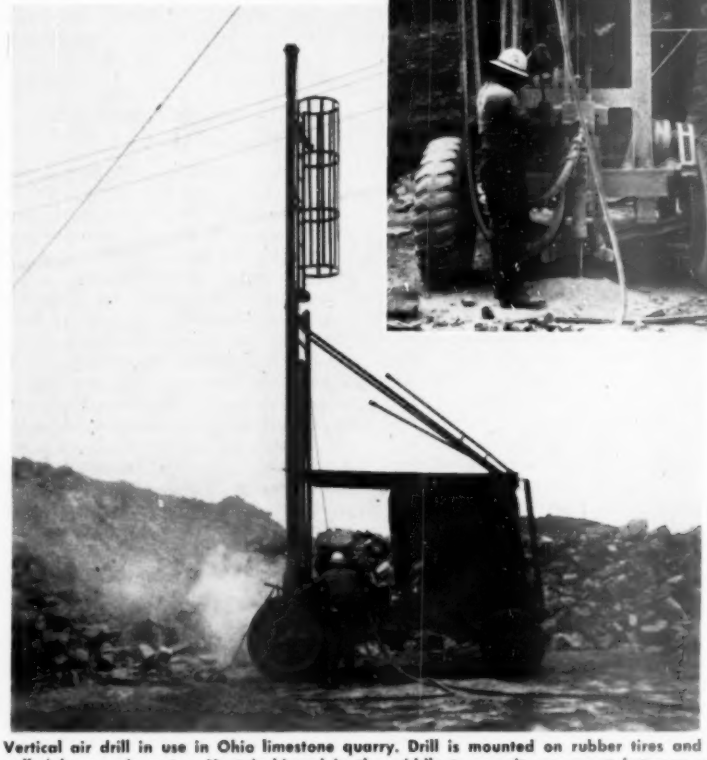


Fig. 8: Blasting pattern of an Ohio limestone quarry, in which liquid oxygen and activated carbon are the explosive

holes is drilled about 6 ft. back from the face, approximately 12 ft. apart, depending on the width of the pit, to provide even spacing. The second row of holes is drilled back of the first row about 10 ft. and staggered so as not to be in direct line with the first row. The width of the pit varies from 50 ft. to 75 ft. so the number of holes drilled and shot varies from 8 to 14 per shot.

"Blasting is done with 'Airmite' (liquid oxygen), using the No. 2 cartridge which is 3½ in. in diameter, 21 in. long and weighs 9 lb. fully saturated. These cartridges are bags loaded with activated carbon and saturated in liquid oxygen making a very high explosive with a velocity of 18,000 f.p.s. which is approximately equivalent to 60 percent dynamite. The 'Airmite' is transported by truck in insulated boxes from a central plant to the blasting area just before holes are to be charged. A very important advantage of using this type of explosive is the fact that in case of misfires, the explosive reverts back to a harmless bag of carbon in about eight hours, allowing the driller to go back and clean out the hole, recharge and shoot; or, if surrounding shots have shattered the stone to the extent that another shot is not practical, the loading shovel can go ahead and load the stone without the danger of digging into an explodable misfire.

"Ten cartridges are used in each hole with primacord tied to the first bag lowered. The remaining nine bags are lowered singly into the holes and then covered with ¾-in. x ⅜-in. crushed stone, which is not tamped, in order to allow gases to escape without blowing the tamping material out of the hole. The primacord is cut off 1 ft. above the top of the hole. After all holes are loaded, a stringer of primacord is strung along the first row of holes and another across the second row of holes. The 1-ft. long primacord from each hole is tied securely to the stringer. An instantaneous electric cap is tied to the end of the first row stringer and a 25-millisecond electric cap is tied to the second or back row stringer. The detonating caps are tied in series to a 500-



Vertical air drill in use in Ohio limestone quarry. Drill is mounted on rubber tires and is propelled by an air motor. Mast is hinged in the middle to permit movement between quarries. Inset: Air hammer in operation; this is lowered and raised by an air brake on the cable drum

ft. long shooting cable which in turn is connected to a blasting machine. We try to keep one full shot ahead of the loading shovel to prevent stone from blowing too far into the loading pit and to lessen secondary shooting. This buffer shooting gives much better backbreak and fragmentation with better control of the throw of the stone, moving the whole shot toward the loading pit without any stone blowing up or back to be cleaned up before drilling of the next series of holes can begin.

"When necessary to fire each hole separately with delay caps, only one row of holes is shot at one time, but trouble has developed with misfires due to cut-offs of primacord or blasting cap wires in some instances. Care must be used in making good connections with primacord and in avoiding kinks, so that misfires will not result.

"Every precaution is used to prevent premature shooting. Blasting cable is always kept reeled up and shunted. Electric detonators remain shunted until time for use. All electric cables and wires are kept out of the pit where shooting is to be done. Only experienced men are allowed to handle and fire explosives.

"Secondary shooting is done with demolition composition C-3 explosive. This explosive was used by the U.S. Army during World War II for bridge and building demolition. Composition C-3 comes in two pound blocks, each two pound block being equivalent to 6½ pounds of T.N.T. The advantage of using this type of explosive is that no secondary drilling is necessary. Composition C-3 is broken off in ½-lb. pieces, placed on the stone and worked into a pancake with the hands. An electric cap is used for detonating it. Many large stones can be shot at one time, but if concussion and noise have to be considered, then not more than two pounds of composition C-3 should be used in each shot. One-half to one pound of this explosive will shatter the largest stone in our quarry to sizes that the 30-in. x 42-in. primary jaw crusher can handle without lost time caused by too large stones plugging the crusher.

"Drilling and blasting of this type has increased production and dropped maintenance costs at our quarry. Good fragmentation increases the loading speed of the shovel with less breakage of shovel parts, by not having to handle too large stone or trying to dig too solid material at the face. Seismograph readings are taken at intervals deemed appropriate, by the company's own instrument."

Limestone with Flint Bands—(11)

This Texas quarry is in a deposit of medium, hard limestone containing 2 percent silica in the form of free banded flint and chert as well as nodules of flint. A face varying from 30 to 70 ft. in height has been developed, into the side of a hill.

Blast holes (6 in.) are drilled with churn drills and spacing is 18 ft. with a 16-ft. burden. They are drilled 2 ft. below the floor. Holes are loaded with 5-in., 25-lb. cartridges. The first cartridge is lowered with primacord and the first four cartridges are of fast powder (60 percent gelatin) to bring out the toe. The holes are loaded the rest of the way with GL202 (Illinois Powder Co.) or du Pont Red Cross. Loading is to within 12-14 ft. from the top, followed by stemming of screenings. Powder ratio is 2.5-3 tons per lb. of explosive.

Instantaneous, 25- and 50-millisecond delay electric caps are attached to primacord on top of the holes, the delays between adjacent holes always being 25 milliseconds. From 6 to 30 holes, in a single row, are shot per blast.

Millisecond delay caps are used for better fragmentation and reduced backbreak. Complaints caused by vibration have been eliminated. For safety's sake, electric caps are not used on cloudy days. On days when there may be static electricity in the air, holes are fired instantaneously by safety fuse and primacord trunk.

Limestone of Variable Layers—(12)

A producer of agricultural limestone describes his practice as follows:

"In the production of agricultural limestone and crushed stone at our quarry we use millisecond delay blasting exclusively and our experience has been entirely favorable.

"Because of the influence of deposit characteristics it is important to determine the depth to drill, when the jackhammer method of drilling is used. Where the lamination of the stone is basically the same we have found that 10 ft. is economically a maximum depth. To determine the depth to drill, the rock should be of the same type to effect an equal fracture from top to bottom. If the lower two or three feet is of a different nature it will cause the force of the dynamite to rise and leave this harder portion in the form of a toe which would then have to be cleaned, partly by hand, and re-shot. If this harder portion could be left to drill and shoot with the next floor it would minimize the cost of shooting and preparing the rock for the crusher.

"Through experience at our quarry we have found that in a multiple row shot you space the holes approximately 4 x 4 ft., with centers on each staggered, so we can obtain a maximum amount of tonnage in a good workable size. We normally drill 4 rows—from 32 to 38 holes—per shot. In loading the shot we use about 10 instant zero caps in a V formation in the center (Fig. 9), then surround these by first delay, using all electric type caps. We attempt to place our detonation caps at about the center of the depth of the dynamite loaded in the holes. We have not been able to differentiate in the placement of the detonation as long as the dynamite is placed in the holes in a like manner from bottom to top. Neither can we find an advantage, or disadvantage,

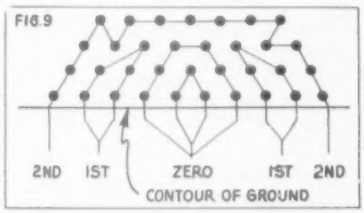


Fig. 9: Multiple row shot with holes spaced approximately 4 x 4 ft. with centers on each row split, or staggered, to obtain maximum amount of tonnage in workable size; delays are indicated

from the various methods of wiring the caps in the shot; one method being as suitable as another.

"This pattern of blasting gives a minimum of secondary breaking. We have found the total breakage, using a multiple row shot, has decreased our over-all cost, including labor for breaking the rock ready for mill size. Only occasionally do we have misfires with fast delay caps but we have never found an apparent reason for misfires when they do occur. When that does take place we re-wire the caps and shoot them again.

"By the use of millisecond delay blasting we have good control of our breakback and it holds the cut-offs to a minimum. As a whole the millisecond delay method of blasting is economical; provides efficient control of throw and is preferred over any other type of blasting."

Lehigh Valley Cement Rock—(13)

Vibration had been a serious problem at this quarry, prior to using millisecond blasting caps, to the point where primary blasts had to be held to 5000 lb. per blast. Since the change, from instantaneous shooting, primary blasts have been increased to more than three times that amount and complaints are rare.

Average height of face is 100 ft. Holes are spaced 25 ft. with 22-ft. burden and are drilled 5 ft. below the floor. Both millisecond delay blasting caps and primacord are used, as a safety measure. One blasting cap is placed near the bottom of the hole and another is attached to the primacord at the top, both caps being of the same period of delay. All holes are wired in series and blasting is done with a power switch of 220 volts.

Experience has shown that bottom detonation practically eliminates toes and that the use of primacord in this hook-up is effective as a safety factor in eliminating difficulties from misfires and cut-offs.

Fragmentation is much improved, production has been increased and there are less choke-ups at the crusher and less repairs on power shovels. The over-all powder ratio, 3.8:1, has not changed but savings in time, labor and money through reduced secondary breaking are considerable.

This producer is of the opinion that best results come from progressive shooting in a single row for faces of 40 ft. or more. He also is of the opinion that if state regulations for the handling of explosives are followed, millisecond delay blasting can be as safe as the old instantaneous method.

Soft Limestone with Hard Spots—(14)

The following letter is from a cement manufacturer who has had limited, but unfavorable, experience thus far:

"We are greatly interested in your forthcoming article on millisecond delay blasting but unfortunately are unable to contribute any knowledge or facts on this subject because of lack of extensive experience.

"We have made only three blasts using millisecond delays and consequently cannot speak with authority.

"The first blast, of 12 holes, single row, was made under the direction of representatives of the explosive manufacturer and proved unsatisfactory regarding yield and time consumed preparing for the blast. The vibration seemed to be reduced but that was not an important item at the time.

"The second blast which consisted of 11 holes single row, we made ourselves. We lost 5 holes in this shot because the primacord was cut off.

"The third shot we also made ourselves and consisted of a double row with instant caps in the front row and delays in the back row. This blast proved to be our best.

"We feel our experience with millisecond delay blasting has not been too satisfactory because of the arrangement of spacing and burden. With the combination of our track system, height of face, type of stone, etc., experience has shown that we get best results (*all* factors considered) with a spacing of 15 ft. and a burden of 20 ft., using a single row. In some places, because of local conditions in the quarry, we use a double row. We are looking forward to motorizing our quarry with a change in our blasting methods. Vibration is now becoming more important to us as our quarry face approaches homes.

"We are sorry we are unable to contribute to your article but assure you we will be interested readers."

Soft Silica Formation—(15)

This deposit is of a rather soft formation which has a tendency not to carry fracture as well as harder stone deposits. Height of face is 32 ft. and a single row of holes is drilled spaced at 17 ft. and 18-ft. burden. Working face is only wide enough to allow the firing of 6-8 drill holes at a time. Best results are obtained with delay caps having a period of 30 milliseconds and sequence firing is followed. Electric caps and a blasting machine are used exclusively, due to the small amount of caps per shot and the shallow depth of holes. Detonation is normally started at the top of the column for best results. The only way to minimize toes is by carefully watching the burden and spacing of holes.

Powder factor is about the same as with instantaneous shooting, vibration is less, backbreak is a little greater and control of throw is simpler. Due to improved breakage and digging, there is a saving in quarry costs. All loading is solid column and there have been no difficulties with misfires or cut-offs. The only extra precaution used against premature blasts is that the lead wires of all caps are kept twisted together until the shot is completely loaded and ready for hook-up to the blasting circuit.

Laminated Limestone—(16)

This midwestern deposit consists of 8 ft. of laminations, 12 ft. of medium hard limestone and the balance of exceedingly hard, flinty limestone. Height of face is 26 ft. and holes are spaced 4 x 4 ft. in four rows, a shot consisting of 150 holes for best results. Optimum delay period is 20 milliseconds, using electric caps and detonation in the bottom third of the hole. Progressive shooting (sequence) leaves a straight face and is preferred. The use of a heavy bottom charge and delays is effective in minimizing toes.

Secondary shooting has been reduced by 50 percent and over-all powder factor is 25 percent less. Savings in cost amount to 20 percent. The main other advantage has been reduction of vibration which has eliminated all complaints.

Limestone with Hard Cap Rock—(17)

Superintendent of this cement plant in the southwest commented briefly as follows:

"We have been using delay caps about 4 years. They have improved our blasting very much to my way of thinking. Delay caps are the best improvement to blasting that has happened in years. We are able to break the rock better and hold it where we want it, and that is very important to us as we still use a railroad in our quarry.

"We have a very hard quarry to blast and we have hard rock on top. Since we started using delay caps we have better fragmentation with the same amount of powder per hole and 50 percent less boulders, and less vibration. I don't know any other quarry using the same method that we use here. We only use one electric cap on each row of holes, using primacord in holes and try to shoot 6 to 10 rows at a time and cover trunk lines with earth or screenings, using a blasting machine to fire with.

"I have been in quarry work since 1912 and I think that the short interval delay is the best thing that they have ever come up with."

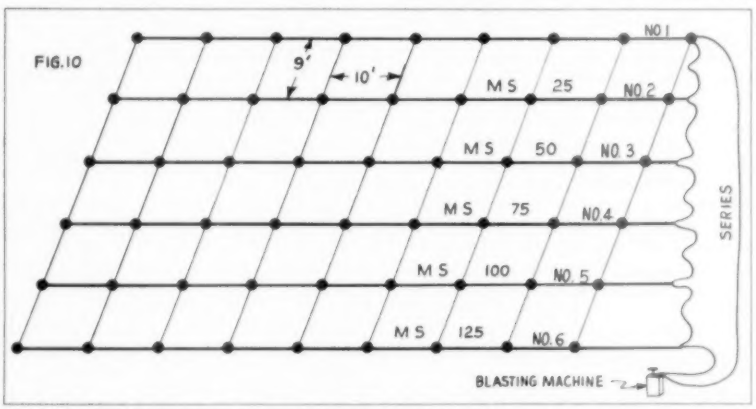


Fig. 10: Six row shot using delay periods of 1-6 with 25 millisecond intervals between. Holes are 3 in. in diameter drilled to a depth of 20-30 ft. by wagon drill. This pattern of drilling results in very little toe. Use 40 percent dynamite loaded in the bottom and 60 percent in the top

Height of face is 18 to 24 ft. and primary shots consist of from 6 to 10 rows (a typical 6-row shot is shown in Fig. 10). From 100-200 holes are shot per blast using caps and primacord, with a 25-millisecond interval between rows. Caps and primacord are used, with caps on top of the holes. Good results have been obtained with respect to vibration, backbreak and control of throw, and secondary breaking has been reduced by 50 percent. Thus far, there has been one cut-off due to machine failure.

Due to the great interest in the subject of millisecond delay blasting and the generous number of responses from producers who participated in this interchange of ideas, this article will be continued in the February issue of ROCK PRODUCTS. *In that way we can allocate sufficient space to cover the subject adequately.*

California's Concrete Aggregate Resources

Review of geological characteristics, aggregate types, specification limitations, and methods of meeting problems involving deleterious materials

By BAILEY TREMPER* and ELDREDGE D. DREW†

GEOLOGISTS DIVIDE the state of California into 11 distinctive physiographic provinces as delineated in Fig. 1. This division is the result of many years of study, and is generally accepted internationally.

The characteristic features of the provinces have had a definite economic effect on the distribution of population, transportation arteries and development of natural resources, including construction materials. The production of aggregates is controlled not only by physiographic environment but also by proximity to markets which generally are in areas of large population.

Production of sand and gravel in California for the year 1950 had a value of over $35,000,000 and was exceeded only by the values of cement and petroleum products. This production placed California as the leading producer of sand and gravel in the United States. Fig. 2 illustrates the growth in production during the last 15 years which has resulted from increased industrial, agricultural, domestic and highway construction.

Fig. 1: Map showing how geologists divide state into physiographic provinces

Sources of sand and gravel in California are principally recent stream deposits, such as stream channels, alluvial cones, flood plains and terraces. In many of the stream deposits there is a replenishment during times of high water and floods. There are, no doubt, immense reserves of stream-laid gravels beneath the valley floors, especially near points where streams debouch into the valley. In the northern part of the state, on the east side of the Central Valley, many of the old dredger tailing piles are being utilized. Sand and gravel are produced in every county in the state except two, San Francisco and Alpine.

In order to give a reasonable picture of concrete aggregate occurrence and production in California a brief description of the eleven physiographic provinces follows:

The Modoc Plateau, Cascade Range and Klamath Mountain provinces consist essentially of thick lava flows, volcanic eruptives and ancient precretaceous rocks. Excellent aggregates are available but are little used because the locations are far from centers of population.

The Northern Coast Ranges comprise a system of mountain ranges and inter-montane valleys with a distinctive north-south trend. They are composed of Mesozoic rocks such as the arkosic sandstones of the Franciscan formation, and large areas of metamorphic rocks. There are many excellent deposits of sand and gravel along the Eel and Russian rivers in this province.

The Southern Coast Ranges are similar in aspect to the Northern Coast Ranges, and have a north-south trend, dominated by the rift of the active San Andreas fault. Rock types are more diversified, however, with Tertiary sediments predominating. Sources of aggregates are poorly distributed in relation to population centers, but plants in Livermore and Pleasant Valleys in Alameda county ship many thousands of tons to areas of demand in the San Francisco Bay region.

The Great Valley comprises the central alluvial plain, about 50 miles

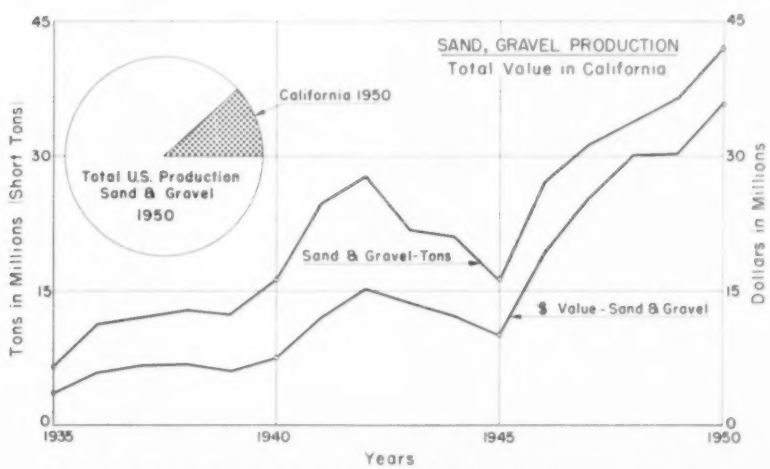


Fig. 2: Showing rapid growth in sand and gravel production during the past 15 years

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†Associate engineering geologist, California Division of Highways

wide by 400 miles long, lying between the Coast Ranges and the Sierra Nevadas. It is in this valley that a great part of the economic wealth of the state is concentrated. Many aggregate plants are located on the rivers and alluvial cones throughout the valley. Sources of sand and gravel are practically unlimited.

The Sierra Nevada province is a tilted fault block which forms the backbone of the state. The western slope dips about 2 deg. and disappears under the valley alluvium. This is in contrast to the precipitous eastern slope. It is composed mainly of a granitic core, with old metamorphics and Tertiary volcanic rocks. In the north and central sections are large reserves of Tertiary sands and gravels contained in remnants of ancient stream beds which could be utilized. On the eastern slope some glacial deposits offer a possible source of construction materials.

The Transverse Range province, between Los Angeles and Bakersfield, is a complex series of mountains and valleys with an east-west trend. The San Gabriel mountains are a source of excellent aggregates close to urban centers. Construction materials are well distributed; however, large areas of siliceous shales in Santa Clara valley contaminate aggregates on the west boundary of the province.

Peninsular Ranges are similar to and probably a part of the Sierra Nevada, as the rock types are granitic intruded into older metamorphics. Construction materials are poorly distributed.

Colorado Desert, Mohave Desert and Basin Ranges contain abundant sources of aggregates but long distance from population centers limits utilization of these deposits.

Aggregate Types

Due to the great variance in the natural environment of the physiographic provinces, the composition of the sands and gravels can not be classified into a few categories. The material composing the mineral aggregates reflects its parent source and in California, with the diversification of rock types in the eleven provinces, petrographic classification is an important factor with respect to quality.

A detailed description of the rock types found in California is beyond the scope of this article. With a few notable exceptions aggregates in the deposits are sound and durable. In those areas where soft particles are found, various means are used to eliminate them as will be described later.

Crushed stone is produced either by crushing oversize gravel or is quarried from suitable rock ledges and crushed to desired aggregate size. The use of crushed stone for concrete is becoming more widespread in California, especially in those areas where alluvial deposits are lacking. Factors necessary for the economic use of quarry-run crushed stone are durability, favorable quarrying conditions, large plants and short haul to areas of demand. Data are not available regarding the amount of crushed stone used for concrete aggregates in California, but nearly 8,000,000 tons were produced in 1949 for all purposes.

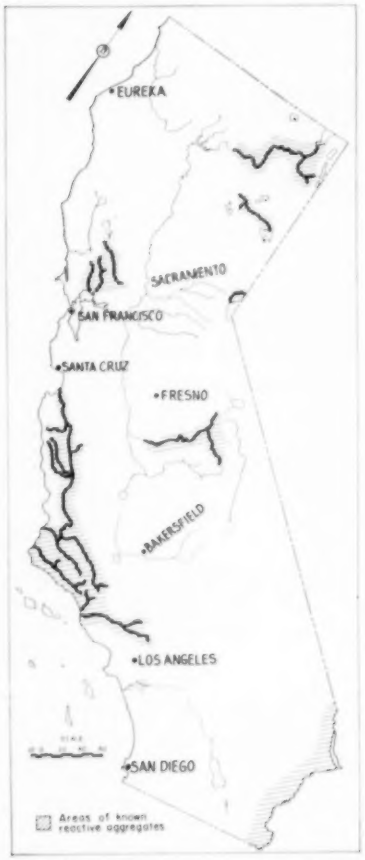


Fig. 3: Areas of reactive aggregates in California

Deleterious Materials

California aggregates as a whole are relatively free of deleterious particles, due in part to source and in part to restrictive requirements in specifications. However, certain areas in the state do contain soft shales, sandstones and various reactive minerals.

The task of producing aggregates that are substantially free of deleterious substances is one of the major problems of the sand and gravel industry. Among those substances that are considered to be deleterious are reactive minerals, soft shales, soft porous sandstones, weathered igneous rocks, certain volcanic rocks and the obvious impurities such as organic matter, wood, coal, mud balls, clay coatings, etc.

Areas in which soft shales occur are confined to constal valleys in the Southern Coast Ranges and Transverse Range provinces. Some of the soft porous sandstones are also found in these provinces.

The Franciscan sandstones of the Coast Range provinces contribute a minor amount of soft sandstone, but as a rule the Franciscan sandstones are hard and durable. Several quarries in the San Francisco Bay area produce crushed Franciscan sandstones for aggregate.

REACTIVE AGGREGATES: In 1940, T. E. Stanton, then materials and research engineer of the California Division of Highways, published his important and well-known paper describing the alkali-aggregate reaction. The first evidence of abnormal expansion that came to his attention was in concrete containing opal-bearing shales from the Southern Coast Range and Transverse Range provinces. Later he found that volcanic glasses originating in the Sierras also contributed to detrimental expansion with high-alkali cements. Subsequent study has revealed other areas that contain reactive aggregates. Approximately 17 of the 58 counties in the state are now known to contain reactive aggregates in some areas. The map, Fig. 3, delineates such areas.

The boundary lines between reactive and non-reactive areas should not be construed as definite borders of division. As a matter of fact, deposits are known to occur within the areas shown as reactive in which no reactive tendency has ever been indicated by laboratory tests. It is not feasible nor is sufficient information available to accurately delineate nonreactive locations within the zones shown as reactive.

Great thicknesses of siliceous Miocene shales in the Coast Range, Transverse Range and part of the Peninsular Range provinces contribute large quantities of opaline and cherty debris to drainage systems. On the west slope of the Sierras many of the recent volcanics have been found to contain reactive minerals. In the Northern Coast Ranges volcanics and highly reactive silica-carbonate rocks associated with serpentine contribute to streams certain amounts of siliceous material considered to be dangerous. A recent survey in two northern counties disclosed new areas containing reactive materials as indicated by excessive expansion in the standard mortar bar test.

During the past 12 years much research has been conducted in all phases of the alkali-aggregate problem. The chart, Fig. 4, has been constructed to show in concise form the basic factors involved in alkali-aggregate reaction. Certain minerals in rocks combine chemically with soluble alkali hydroxide derived from the cement to form gels. Damage to the concrete has been attributed to osmotic pressure or to simple swelling of the gels as they imbibe water.

Recognition in the field of aggregate-alkali reaction is complicated by the fact that outward signs such as pattern cracking, popouts and expansion may also result from other causes. Petrographic examination of concrete specimens should be made to furnish conclusive evidence of alkali-aggregate reaction.

SHALES: As discussed above, many California shales contain reactive opal but frequently associated with them are non-reactive shales which are objectionable because of physical properties such as structural weakness, high water demand and volume change propensities. Mild climatic conditions in areas containing shales result in less physical deterioration of concrete from the presence of shales than would be experienced under more severe conditions of exposure. Heavily-traveled concrete pavements in service over 20 years, for instance, under favorable circumstances show no outward signs of distress other than scattered surface pits representing the former locations of particles of non-durable shale in limited quantity. Such instances should be regarded merely as illustrations of the fact that concrete in service sometimes escapes the damage that frequently occurs from structural weakness imparted by aggregates that are too soft. The problem in establishing specification limits is to restrict deleterious particles to amounts that are generally safe for the type of service required without imposing costly prohibitions on the utilization of available deposits.

What has been said concerning shales applies in a general way to soft sandstones and weathered granites. The latter are found in certain areas, in the vicinity of Los Angeles particularly, in all stages of decomposition. It is impossible to restrict the percentage of softer granite by count of soft particles since there is no distinct break at which a separation can be made. The over-all effect of decomposition must be measured by other means.

Deleterious materials such as gypsum, alunite and epsomite, although present in California, have not constituted problems, to the writers' knowledge, in the production of concrete aggregates.

Organic matter, clay balls, wood, clay coatings and the like present no problems not common to other regions and no special comment is required beyond the fact that clay coatings in certain localities are remarkably adherent and difficult to remove.

Specification Limitations

The statements that follow in this section refer specifically to Standard Specifications of California Division of Highways with respect to restrictions placed on deleterious materials. In general, they are typical of requirements of other users but deviations will be found.

It is the policy to designate the use of low-alkali cement (not over 0.60 percent alkalies, calculated as Na_2O) whenever known or suspected reactive aggregates are proposed for use. The state pays directly any premium required for furnishing low-alkali cement since it is felt that in any event it would have to bear the additional cost under indirect methods. This means that reactivity in aggregates is not a factor in competition between producers. It is conceivable that this policy could react to the financial disadvantage of the state in certain instances. A survey of the situation, however, has indicated that conditions are such that possible savings would be offset by the added expense of administering an indirect method of control.

Shales are controlled as to quantity and quality by requirements of the sodium sulfate soundness test. The harder varieties are accepted in greater amounts than the more friable, porous types.

The soundness test also rejects excessive amounts of certain sandstones which are less detrimental to concrete strength than are the shales as a class. For this reason, the soundness requirement is on a sliding scale depending on the percentage of shale that is present in the material. The higher the percentage of shale, the lower is the acceptable loss in the soundness test. Neither shale nor sandstone can be limited successfully by the Los Angeles rattler test primarily because of the rather high limits of acceptance found necessary to admit usable amounts of the softer granites.

The "wash" test is used to control silt and clay. This test is similar to the A.S.T.M. or A.A.S.H.O. determination for percentage finer than the No. 200 sieve, but a preliminary soaking period of three hours is used and separation is made on the No. 270 sieve. The wash test is performed prior to screen analysis, and a small amount of additional fine material is separated in the dry sieving and is added to that lost in the wash test proper.

Organic matter in fine aggregate is controlled by the standard A.S.T.M. method.

The strength developed by fine aggregate in mortar is not determined by the A.S.T.M. method which uses a fixed water-cement ratio paste. The common dissatisfaction with this method is shared by the Division of Highways. Instead, the ratio of aggregate to cement is on an absolute volume basis which results in a nearly constant cement content in the mortar. Furthermore, the test sample is screened and recombined to a fixed grading on No. 30 and coarser sieves. The amount passing the No. 50 and finer sieves in the test mortar is in proportion to the original quantities in relation to the No. 30 sieve and thus reflects the presence of silt and clay in the material sampled. The test is designed to measure the inherent quality of the aggregate apart from the complicating effect of varying grading. The consistency of the mortar is controlled by the flow table. Water requirements are found to have a definite and usable relation to the requirements of the sand in concrete. As a result the test is found to be an exceptionally good indicator of the strength-producing properties of the sand when it is used in concrete of fixed cement content. A present weakness in the test, and one that is common to other mortar strength methods, is a failure to control, or properly adjust for, variations in strength of the mortar occasioned by varying amounts of air entrained in the mortar during the mixing procedure. The air thus incorporated

(Continued on page 200)

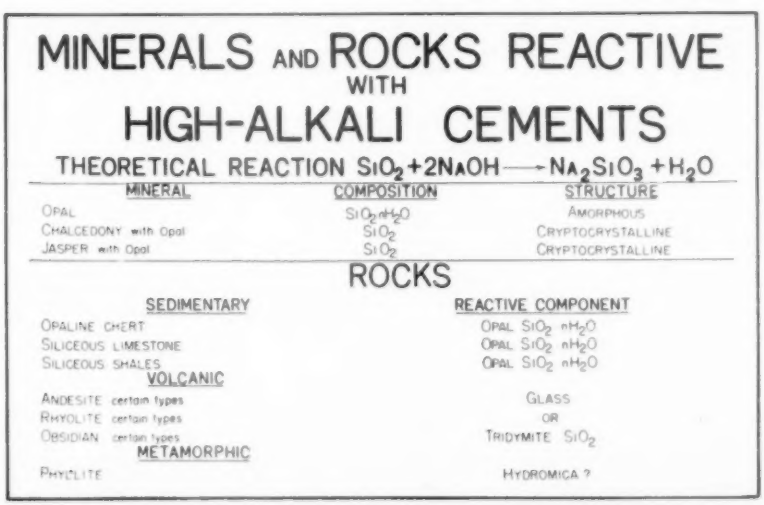
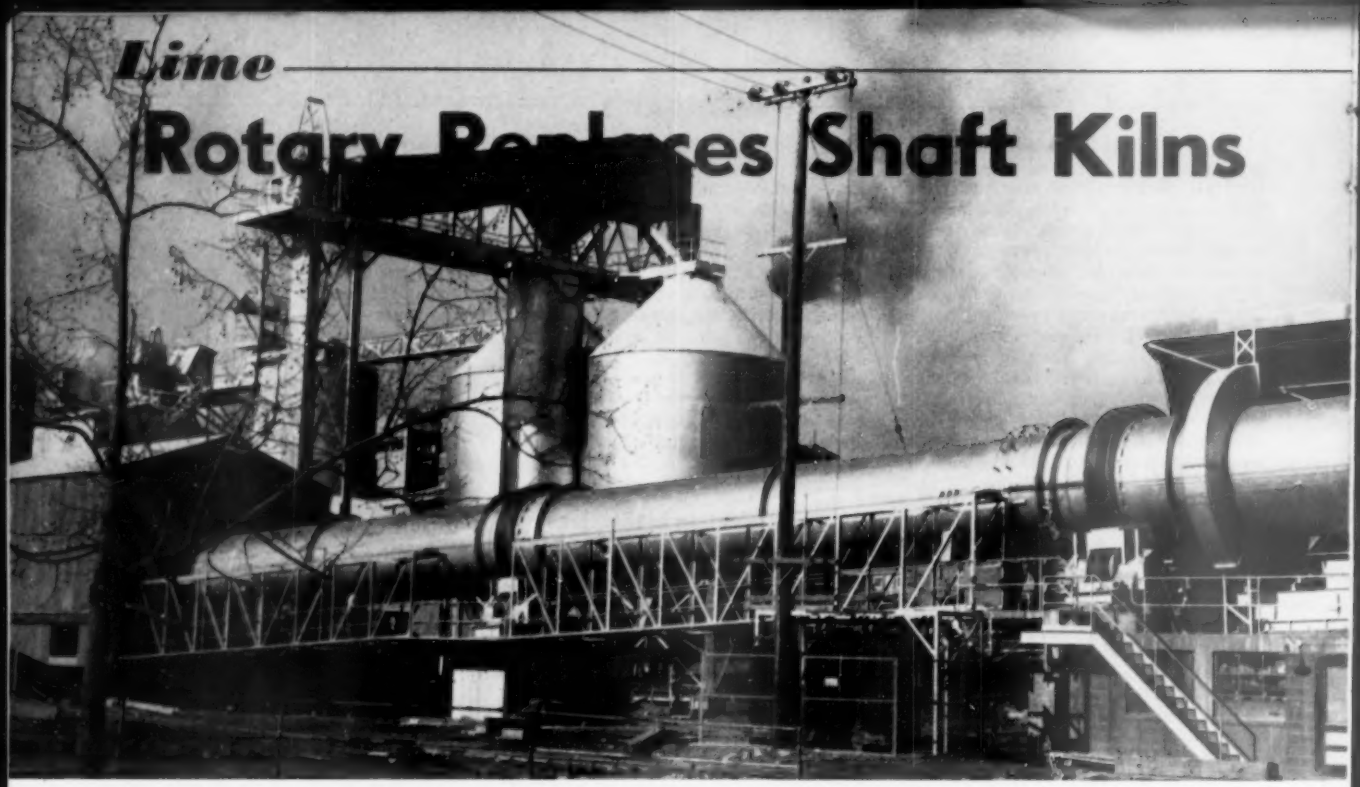


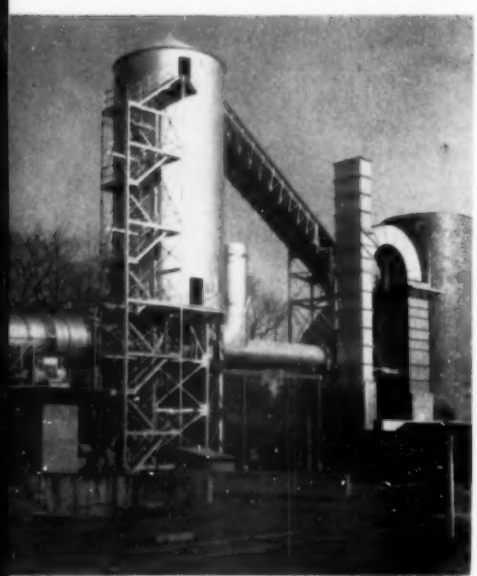
Fig. 4: Chart indicating minerals and rocks which are reactive with high-alkali cements

Lime

Rotary Replaces Shaft Kilns



Lime elevator and conveyor to storage bunkers, to the left. There are two bunkers of 750 tons each and two of 150 tons for off-grade material or special sized products. Incoming power line at 2300 volts with local substation, reducing voltage to 440 volts, in center foreground. Electrical distribution system in drive foundation



Two-compartment, steel feed bunker holds total capacity of 400 tons. Beyond the horizontal duct with stub natural draft stack is the fan, gas-up-take and spray tower which is down-flow. In the background is the tile "silo" which is the up-take for scrubbed gases. Inside diameter is 24 ft. to give sufficient area to avoid the discharge of water-phase moisture. Feed bunker filled only once per 8-hr. shift. Fan discharge through gooseneck to top of scrubber; gases and sprays directed downwards, clean gases discharge through silo. Pump station installation (back of railroad car) consists of circulating pump, two slurry pumps and deep-well pump for make-up

By IRVING WARNER*

PICTURED ON FOUR PAGES is the story of the installation by the Warner Co. of its No. 2 rotary kiln at the Cedar Hollow dolomitic lime plant. The kiln has a rated output of 360 tons daily. With the starting of this kiln on January 29, 1952, all the remaining shaft kilns were closed down. The No. 1 rotary kiln, not shown, is 8 x 150 ft., and is operated only when additional output is needed.

The new kiln, supplied by Vulcan Iron Works, has a 9 ft. inside diameter and is 300 ft. long, and operates in the open except the last tire and the discharge section carrying the Unax coolers. The kiln is fired by a No. 473 Raymond bowl mill with the coal feed controlled by a Schaffer Poidometer with Reeves variable

*Vice-president in charge of engineering and purchasing, The Warner Co.

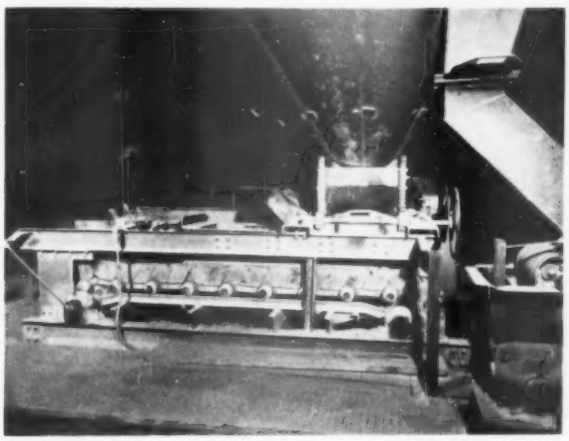
Sized stone is trucked to storage from crusher plant. Three sizes are stocked, (A) 3 in. rd. x 1½ in. rd., (B) 1½ in. rd. x ½ in. sq., (C) 1 in. sq. x 7/16 in. sq. Stockpiles contain a maximum of 10,000 tons of which 2700 tons is active storage. Tunnel is 248 ft. long

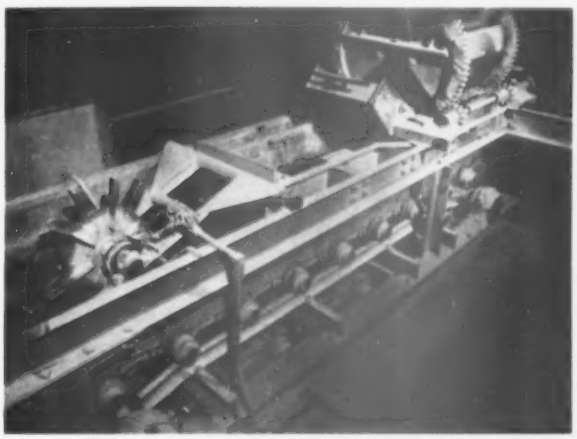
(Continued on page 152)

Looking toward upper end of 9- x 300-ft. kiln. Note heavy stiffener rings (2- x 10-in.) placed at points of greatest shell stress to prevent ovalation

Interior of 7- x 7-ft. tunnel. There are nineteen 16- x 16-in. duplex gates. Note stopper on quadrant bar which limits the opening so stone will not overflow belt when stopped. With a fixed setting of the desired gate, operator simply uses start and stop buttons on motor

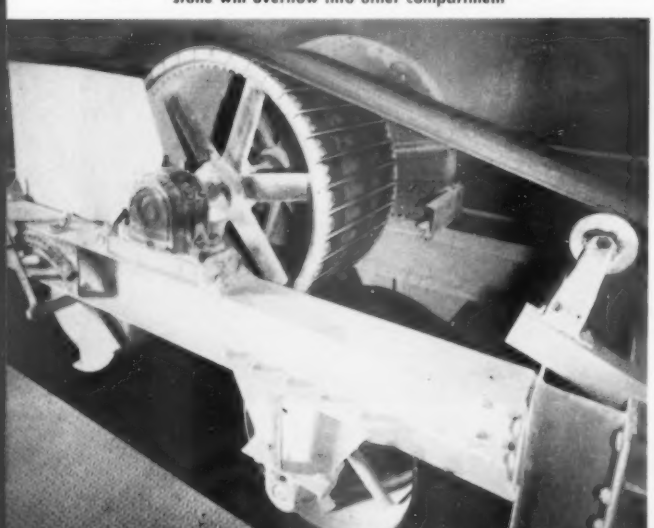
Feed rescreener on the floor directly below feeder. The rotary screen, mounted on spiders, is rugged and gives a cascading action to free sized stone of adhering fines. The screw conveyor in the foreground has been replaced by a small belt conveyor. Damp screenings fouled the conveyor flights





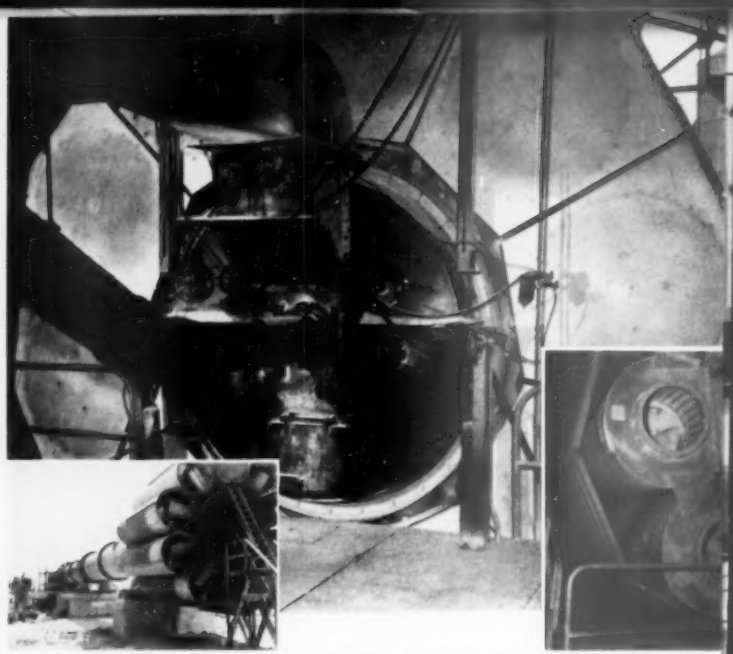
Two views of 18-in. volumetric pan conveyor. Hand wheels at right operate two single undercut gates which control the flow from the two compartments. Feed can be drawn from either side or both sides simultaneously. The two feeds may be roughly proportional if desired. Levelling gate is to the left of gates. Set at an angle of 45 deg., it rises to clear a large frozen lump and returns automatically to its setting. Pinwheel at discharge end rotates with the load and operates a flicker light in the control room. Light stays on or off steadily if not in operation or if conveyor is empty. Stone counter is at extreme left. Loading is checkweighed daily. The weights and the counter constitute the output record of the kiln. Feeder is now operated by a timer with a contactor on the kiln shell to give so many seconds of feed per kiln revolution. This is not satisfactory and will be replaced with an electric synchro-tie drive to give a continuous operation of the feeder at a fixed ratio with the kiln speed

Drive of inclined 24-in. belt conveyor at top of feed bunker. Head pulleys are lagged with spaced maple strips rather than rubber belt sections. Note gate control for delivering stone to either compartment or to both simultaneously. If either compartment fills, stone will overflow into other compartment



Pan conveyor for evacuating the four storage bins and delivering the lime for rescreening for shipment or to the hydrating plant

Kiln support base and cooler end. Double radiation plates protect the bearings from the kiln radiant heat. Manhole in shell facilitates removal of scale. At the lower right can be seen the inclined pan conveyor taking the lime to the single roll crusher. This crusher is adjustable while operating and has an automatic release and reset in case a hard oversize particle is encountered



Discharge end of kiln showing shallow-end shield and its attachments. End shield and cooler heads are insulated. Note hot air pipe to coal mill and optical pyrometer at upper right of shield directed on the lime. Inspection slide gate is easily operated. Pentagon cooler heads retain heat regenerated by the coolers yet permit some air circulation and inspection.

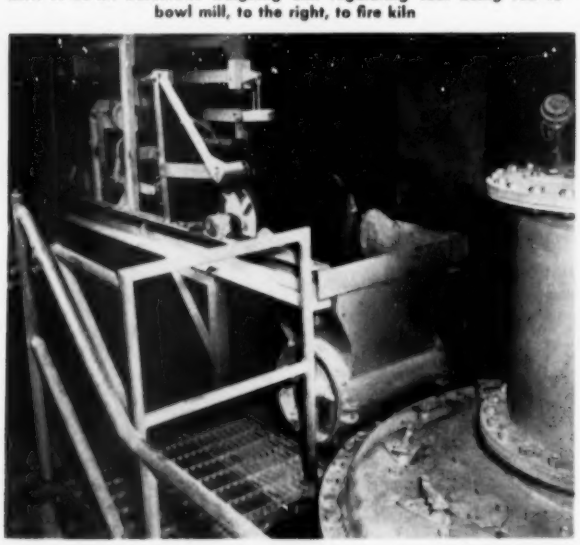
Rotary Replaces Shaft Kilns

speed drive. Kiln drive is a V-belt to Philadelphia Gear Co. triple-reduction gear reducer through a 230 F Falk flexible coupling. Emergency drive is a 10-hp. type U1 International Harvester engine. The bunker construction, including feed bunker, was furnished by Fanning-Schuett Engineering Co., Philadelphia, Penn. Buffalo Forge Co. supplied the stack fan. All the mechanical equipment for the 24-in. inclined conveyor belt to the top of the feed bunker is Link-Belt,

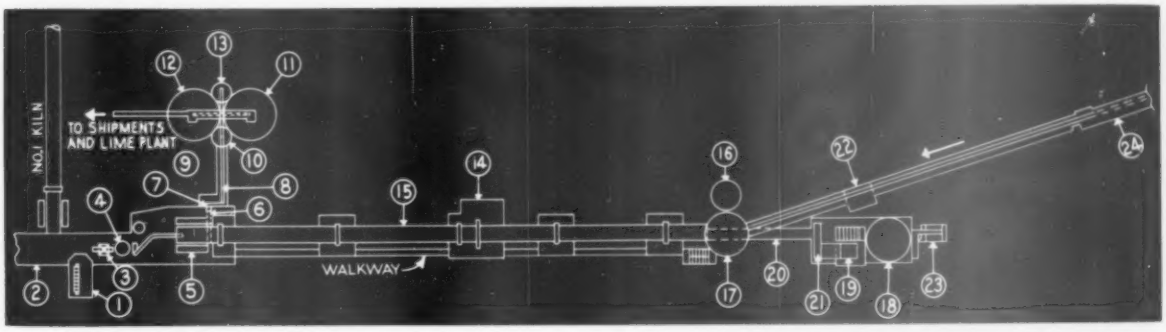
(Continued on next page)

Inset views show coolers during construction. There are ten coolers 4½ ft. in dia. and 18 ft. long; one of the views shows the discharge end with screens for rejection of oversize. Note the insulating panels which constitute a decagon enclosing 12 ft. of the hot end of coolers. Between the exposed end of coolers and the kiln shell are radiation plates to protect the cool end of the coolers from being heated by the hot shell. An effort is made to regenerate heat in the lime for useful heat in the kiln

Left: A 20-in. automatic weighing unit regulating coal being fed to bowl mill, to the right, to fire kiln



Right: Kiln drive comprises a 125-hp. slip ring motor, a V-belt, and triple-reduction gear reducer with flexible coupling. An emergency drive is the 10-hp. gasoline engine, to the left, which can drive kiln at one revolution per 22 min. Radiation shield over gear box also extends over coupling. Speed recorder generator, back of guard in center foreground, connects to "kiln speed" in control room



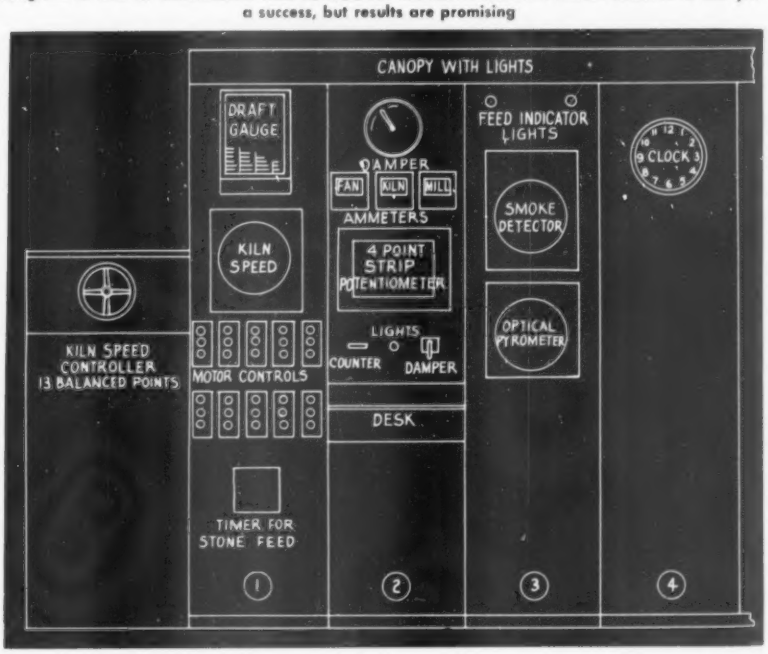
Arrangement plan of No. 2 rotary kiln. (1) Control room instruments. (2) Coal bunkers. (3) Automatic weighing coal feeder. (4) Coal mill. (5) Lime coolers. (6) Apron conveyor. (7) Crusher. (8) Bucket elevator. (9) Elevated belt conveyor. (10) Reject bin-truck to dump. (11) Pebble lime storage bin. (12) Pebble lime storage bin. (13) Small pebble lime storage bin. (14) Kiln drive. (15) Kiln. (16) Screenings from feed bin. (17) Feed bin, feeder, rescreener. (18) Stack. (19) Gas scrubber. (20) Flue breeching. (21) Fan. (22) Inclined belt conveyor. (23) Thickener tank. (24) Stone storage over tunnel belt conveyor

including 75-hp. drive with hydraulic coupling, S 100 gear reducer and 2-in. pitch, and No. RC roller chain drive to head shaft. Link-Belt also supplied the pan conveyor taking lime to the 18- x 24-in. McLanahan and Stone single roll crusher. The instrument panel was supplied by Falstrom Co. Westinghouse motor controls are used. Hays Corp. supplied the draft gauges, Brown Instrument Co. furnished kiln speed, strip potentiometer and radiamatic instruments, and General Electric Co. supplied the selsyn damper position indicator. A self-energizing telephone was supplied by Hose-McCann Telephone Co. All motors are Westinghouse 3-phase, 60 cycles, 440 volts. Details of motor application are shown in the table, to the left.

Location	Drive	Hp	Synchronous Speed
Coal mill	Direct drive	150	1200
Main kiln drive	V-belt-Reducer	125*	1200
Draft fan	V-belt	125	1200
Inclined belt conveyor	Hydraulic coupling-Reducer-Roller chain	75	1200
Circulating pump, scrubber	V-belt	50	1200
Tunnel conveyor	Gear reducer-Roller chain	20	1800
Crusher-lime	V-belt	20	900
Bucket elevator	V-belt-Reducer-Chain	10	1800
Pebble lime belt conveyor	V-belt-Reducer-Chain	7½	1800
Scrubber scale disintegrator	Reducer Chain	7½	1800
Feeder	V-belt-Reducer-Chain (To be replaced by synchro-tie drive)	7½	1800
24-in. pan conveyor under bins	Electro-Fluid-Reducer-Chain	7½	——
Rotary screen	V-belt-Reducer	5	1800
Screenings conveyor	Hydro-sheave, V-belt-Reducer	5	1800
18-in. pan conveyor, kiln to crusher	V-belt	5	1800
Slurry pump	V-belt	3	1800
Poidometer	Variable speed	2	1800

*Wound rotor—all others squirrel cage

Diagram of half of switchboard with controls for the No. 2 kiln. The smoke detector is not yet a success, but results are promising



Domestic Lime Sales

DOMESTIC SALES of open-market lime totaled 4,968,578 short tons during the first eight months of 1952, as reported to the Bureau of Mines. Sales of dead-burned dolomite, which had been adversely affected in June and July, due to the steel strike, rose sharply in August. The following table shows sales by types and major uses, in short tons:

	January-August, 1952	August 1952
By types:		
Quicklime	3,731,089	533,017
Hydrated lime	1,237,489	158,931
Total lime	4,968,578	691,948
By uses:		
Agricultural:		
Quicklime	38,625	7,079
Hydrated lime	145,473	13,140
Total	184,098	20,219
Building:		
Quicklime	141,249	19,558
Hydrated lime	621,532	86,145
Total	762,781	105,703
Chemical and other industrial:		
Quicklime	2,420,153	329,669
Hydrated lime	470,484	59,646
Total	2,890,637	389,315
Refractory (dead-burned dolomite)	1,131,062	176,711

Seek Dredging O.K.

NATIONAL SAND AND GRAVEL CO., Lorain, Ohio, has asked Army engineers for permission to carry on sand and dredging operations in Lake Erie. Federal regulations stipulate that public notice of such proposed dredging operations be given in order that interested parties who have any objections to the operation from a navigational standpoint (the proposed dredging area is six miles off-shore and occupies an area 10 miles long and 6 miles wide) may file complaints with the engineers.

PROSPECTIVE CHEMISTRY

of Cement and Concrete

Part V—Structural chemistry of some of the minerals in concrete aggregates

By NATHAN C. ROCKWOOD

CONCRETE AGGREGATES ARE COMPOSITES of numerous minerals, as described in the November article of this series. Just how much their properties are determined by the bonds which hold the separate mineral crystals together as a rock is not known as yet by any one, so far as we can determine. The bonds are both physical due to interlocking and packing of the particles and chemical because of ionic attraction between the surfaces of adjoining crystals. The minerals themselves are essentially chemical entities for which chemical formulas can be written, and for which structural lattices can be determined. With the exception of limestones and dolomites, practically all the rocks used as concrete aggregates are silicates, which means that the primary lattice is one or more of the types of the silica tetrahedron (SiO_4) lattice. By most mineralogists silica (SiO_2) itself is now treated as the silicate of silicon, rather than as silicon dioxide, for its general structure is one of the forms in which other silicates also occur.

We have described in previous articles three of the various types of the silicate structure. They are repeated here with others to provide a comparison. It must be recalled that the single silica tetrahedron is negatively charged SiO_4 where the positively charged silicon ion with a valence of +4 is in the center of the tetrahedron with the four apices formed by the oxygen ions, each with one unused negative charge. Since the silicon ion is practically in contact with the four surrounding oxygen ions, the easiest conception of the silica building unit common to all silicate lattice structures is as a close group of three billiard balls on a table with the fourth resting equally on top of these three, and with a colored marble to represent the silicon ion in the space where the four billiard balls come together.

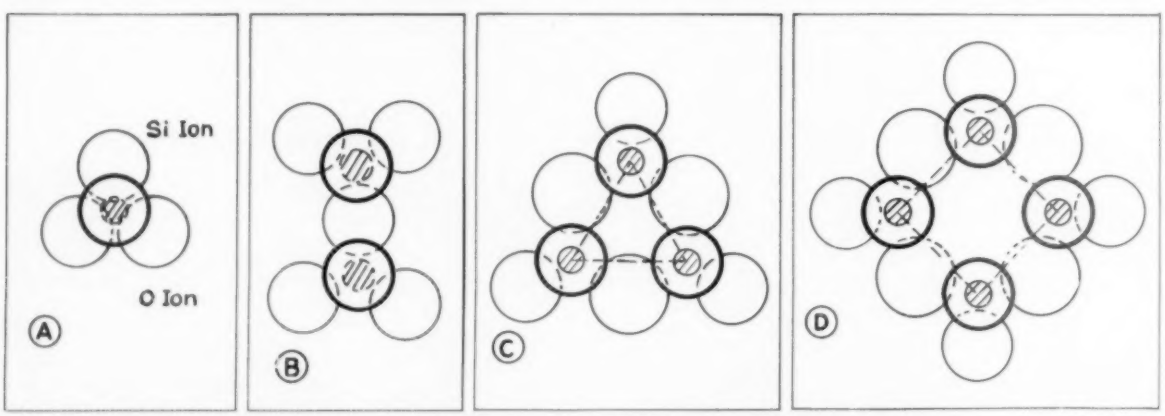
The sketches herewith illustrate the five main types of silicate structure. In all of them the silica tetrahedron persists, the difference in the structures (and in the corresponding chemical formulas) being merely the way in which the tetrahedra are linked to those adjoining, or how many of the oxygen ions have unused charges. This makes possible a systematic classification of the various silicates, and all the silicates among concrete aggregates fall into one or the other of these classifications or combinations of them. Eventually, probably hardened portland cement paste will find a classification here, which may greatly help to explain its properties.

Structures of Silicates

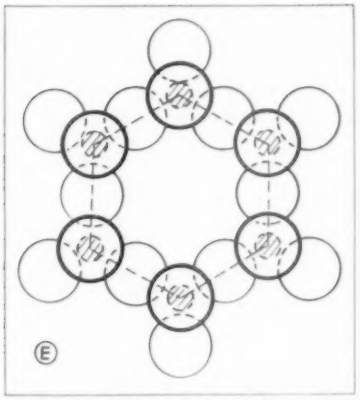
In the upper part of the earth's crust or lithosphere, silicon is the most abundant element next to oxygen. However, as will be remembered by reference to the dimensions of the atoms of elements in the July, 1952, article of this series, it is a relatively small element, being about one-fourth the size of the oxygen atom or ion. The silica (SiO_4) tetrahedron is therefore the most numerous single structural unit of the mineral kingdom; about 25 percent of all known minerals are silicates and nearly 40 percent of the common minerals are silicates. Thus the silica tetrahedron in some type of lattice structure constitutes almost the entire crust of the earth, of which 60-odd percent of the whole is silica (SiO_2).

Now, referring to the series of figures herewith, which may appear at first glance to be merely exercises with a compass, one can with a little study readily trace the types of silicate lattices, remembering always that they are merely combinations of the "five-ball" group shown in (A)—that is a tetrahedron of four oxygen "balls" with the small silicon "ball" hidden in the interspace. The circle in boldest outline represents the oxygen ion on top of the three below. The spacings are not the same in all illustrations but neither are they the same in all silicates, the distances between the silicon and oxygen ions depending to some extent on the attraction of other cations (positively charged ions) for the negatively charged oxygen ions (anions), and even the force of this attraction varies with the "freezing" temperature (or the vibration or agitation of the ions) at which the silicate solidified, as was described in the September, 1952, issue article in discussing the probable structure of calcium disilicate as it exists in cement clinker.

Some of the less common silicates are composed of the single or separate (discrete) silica tetrahedra shown in (A). These are classified



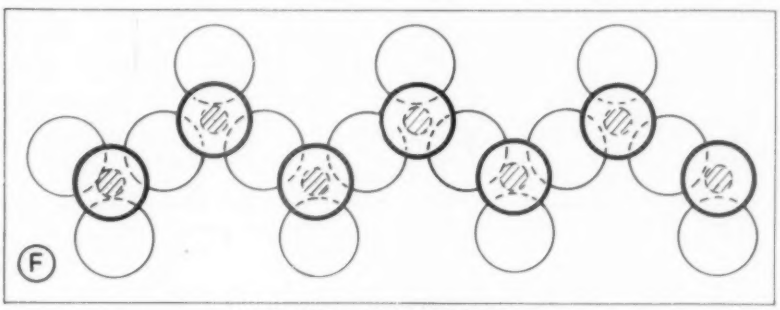
(A) SiO_4 single silica ion—simplified Nesosilicate. (B) Si_2O_7—Sorosilicate. (C) Si_3O_9—trigonal ring—Cyclosilicate. (D) Si_4O_{12}—tetragonal ring—Cyclosilicate



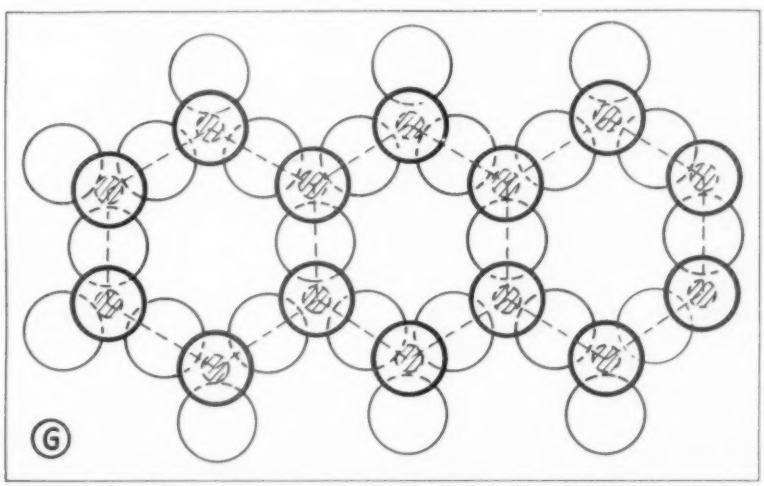
(E) Si_6O_{18}—hexagonal ring—Cyclosilicate

as the Nesosilicates, from the Greek word for island. The most familiar one is probably Forsterite, Mg_2SiO_4, which however is not common in quantity and hence apparently not considered important as a constituent in concrete aggregate. Forsterite is one of the olivine minerals, the others being Fayalite, Fe_2SiO_4, and Tephroite, Mn_2SiO_4, and mixtures or combinations of these. Olivine, is, however, a common but minor constituent in igneous rocks and also is not uncommon in crystalline limestone and dolomites. Some day it may be found to have an influence on weathering of an aggregate which contains appreciable amounts, for olivine does alter or deteriorate readily in Nature. Incidentally, Hillebrandite ($Ca_2SiO_4 \cdot H_2O$), frequently referred to in portland cement literature as a rare natural hydrous dicalcium silicate, is classified by mineralogists as a Nesosilicate.

This is probably as good as any place to point out a fundamental difference in silicates containing aluminum. This element is similar in many respects to silicon and may substitute for it in the tetrahedron we use to illustrate that of silica (A). But when this happens one of the oxygen ions may be only loosely attached to the aluminum atom which has a valence of three against four for silicon, or possibly in some other manner the AlO_4 tetrahedron has five negative charges to dispose of. Hence, in order to neutralize any lattice structure containing AlO_4 and SiO_4 as a whole, some additional positively charged ions (cations) must be introduced to provide for the extra negative charge. When this is done we have the essential structure of the feldspars, which we will go into later, for the feldspars are very important components of many concrete aggregates. The other way in which aluminum occurs in minerals is in Nesosilicates as in Sillimanite, Andalusite and Kyanite, the chemical formula for which is in each case $Al_2O \cdot SiO_4$. Different crystallizations account for the different mineral names. If the same chemical combination occurs in portland cement, it would probably be found written as $Al_2O_3 \cdot SiO_2$. In true mineral formulas, however, the Nesosilicates can always be distinguished by the (SiO_4) standing as a separate unit.



(F) $(SiO_3)_n$—chains—Insosilicates



(G) $(Si_4O_{11})_n$—double chains Insosilicates

The Sorosilicates

Some mineralogists include in the Sorosilicates not only joined pairs of SiO_4 tetrahedra as in (B) but such groups as are illustrated in (C), (D) and (E). The name implies "group" from the corresponding Greek word. We have stuck to the terminology of the latest American textbooks which make two classifications in the grouping. This classifies as the Sorosilicates only those in which two tetrahedra are joined by a single oxygen ion link, which provides the chemical formula Si_2O_7. The general formula for minerals in this classification is $A_m(B_2X_7)_n$ in which A may be almost any metal cation, B either Al or Si or both and X is O or possibly some other anion. In the Silicates (B_2X_7) stands for Si_2O_7, of course, which is the common unit in all Sorosilicates. Examples are Akermanite, $Ca_2MgSi_2O_7$, and Gehlenite, $Ca_2Al(SiAl)O_7$, which are found in slags but rarely in rocks. The most interesting Sorosilicates to cement and concrete researchers are Rankinite ($Ca_3Si_2O_7$) and Afwillite ($Ca_3Si_2O_7 \cdot 3H_2O$), which in portland cement terminology would be $3CaO \cdot 2SiO_2$, without and with water of hydration. This hydrated product is usually said to be an end product in portland cement hydration. Both are exceedingly rare in Nature. If $Ca_3Si_2O_7 \cdot 3H_2O$ is a Sorosilicate with the SiO_4 tetrahedra in groups of two and the previously mentioned Hillebrandite, $Ca_2SiO_4 \cdot H_2O$, (or $2CaO \cdot SiO_2 \cdot H_2O$) a Nesosilicate with discrete SiO_4 tetrahedra, evidently increasing the lime content by natural processes tends to disperse the (SiO_4) units, for it should be remembered from the August, 1952, article of this series that Wollastonite, $CaSiO_3$, the intermediate silicate, or the monocalcium silicate of portland cement terminology ($CaO \cdot SiO_2$), has a trigonal ring structure.

Apparently then, Nature's process of "saturating" the three dimensional silica lattice with lime is first to break it down into two dimensional rings, then to single dimensional chains with finally only one linkage left between tetrahedra, and eventually into single discrete tetrahedra, which are bound to the lime or calcium ions but not to each other. The anhydrous minerals apparently come only from melts and the hydrated ones only from solutions, true or colloidal. The Sorosilicates are not common enough, evidently, to be considered in connection with the qualities of concrete aggregates.

Cyclosilicates

The sketches (C), (D) and (E) are three examples of the Cyclosilicates, from the Greek word for ring. In all of these it will be noted that there is a common oxygen ion between each of the silicon ions forming the ring. This makes the available O ions in the chemical formula dependent on the number of Si ions in the ring. Thus the trigonal or three silicon-ion ring is Si_3O_9, the four silicon-ion or tetragonal ring Si_4O_{12} and the hexagonal or six silicon-ion ring, Si_6O_{18}. As we have already noted (August issue) Wollastonite is $CaSiO_3$ or mineralogically $Ca_3Si_3O_9$, and is an example of a Cyclosilicate of the trigonal ring classification. It is not common, but may occur in limestones in quantity near the contact zone with an igneous rock. The tetragonal (four) ring structure is apparently very rare by itself, but it may occur as combinations of tetragonal and hexagonal rings in the Phyllosilicates.

Insosilicates

The sketches (F) and (G) are Insosilicates from the Greek word for fiber. They are formed of infinite single or double chains of silica tetrahedra, having in the case of the single chain one common oxygen ion link between two adjoining tetrahedra. This gives for the single chains the chemical formula SiO_3, which is the same *chemical* formula as that of Wollastonite, but Wollastonite is *mineralogically* $Ca_3Si_3O_9$, for that formula only describes its structure. The general formula for Insosilicates is $A_m\ (BX_3)_n$, where the letters mean the same as previously described under Sorosilicates above. The large and important group of minerals known as the Pyroxenes are Insosilicates. These include Augite, which was listed in the article by Woolf, abstracted in our discussion in the November, 1952, issue as a significant constituent of concrete aggregate made from diorite, andesite, gabbro, diabase and basalt rocks or gravel. It may constitute as much as 46 percent of altered diabase. How important it may be to the durability of an aggregate apparently is not known at this time, but being of a fibrous structure means that it may provide ready access to water solutions of ions which could cause solution or disintegration. In any event the Pyroxenes do weather readily. Chemically, Augite is a silicate of calcium, iron, magnesium and aluminum of the general mineralogical formula $Ca(Mg,Fe,Al)\ (Al, Si)_2O_6$ —the lattice unit being $(SiO_3)_2$ or its aluminum equivalent. This way of writing the formula means that any one or all the elements in the first parenthesis (Mg,Fe or Al) may occur with calcium and either Al or Si or both may be the center ion in the tetrahedral lattice. It will be noted that aluminum (Al) occurs in this formula in both possible ways—in its more usual 6-coordinated form the same as Mg, or 4-coordinated as in the Si tetrahedron. Diopside is $CaMgSi_2O_6$. Enstatite is $Mg_2Si_2O_6$.

The silicates in which double chains (G) constitute the main lattice are called Amphiboles. The double chains, as can be seen in the sketch, are made up of single chains, or they are a series of hexagonal rings with two tetrahedra common to each pair of rings. The mineralogical formula works out (Si_4O_{11}) or units thereof. Chemically the Amphiboles are very similar to the Pyroxenes with one important difference. They contain (OH), or hydroxyl ions, which are not attached to the SiO_4 tetrahedra, but to the Mg, Fe, Ca, Al or cations other than the silicon or aluminum ions forming the primary tetrahedra lattice structure.

The only Amphibole specifically referred to in the Woolf article is Hornblende, a complex silicate of calcium, iron, magnesium and aluminum. Its chemical analysis may show various proportions of these elements but Si_4O_{22} which is $(Si_4O_{11})_2$ or its equivalent $Si_8Al_2O_{22}$, or Si_7AlO_{22}, is a part of all the formulas. Also, $(OH)_2$ or two hydroxyl ions appear in all formulas. Upon heating to sufficiently high temperatures, the hydroxyl ions are driven out as water vapor. Hornblende is an important constituent of igneous rocks, and can be, on an average, about 20 percent of some rocks used as concrete aggregates (see chart p. 91, November, 1952, issue of ROCK PRODUCTS).

The Amphiboles are apparently altered Pyroxenes and consequently have already attained a start toward changes leading to disintegration. If they contain sodium or some other element readily dissolved, they alter or weather so much the easier. Incidentally, next to sodium, calcium is the most easily dissolved element. Both Pyroxenes and Amphiboles have cleavage planes, which of course aid disintegration. In both groups the calcium, magnesium, iron, manganese and some of the aluminum form no part of the tetrahedral chains, they merely serve to tie the chains together lengthwise. Hence, when some of these linkages are (OH) ions, or water, the bonds are weak. Of interest to cement researchers is Crestmoreite or Riversidite $2CaSiO_3{\cdot}3H_2O$, a rare mineral found in California which mineralogists classify as an Insosilicate. This formula has one O missing from the formula given above for the Nesosilicate Hillebrandite $(2CaSiO_3{\cdot}H_2O)$, so it isn't the same mineral. Perhaps it is Hillebrandite with another molecule or two of H_2O to account for the lost O!

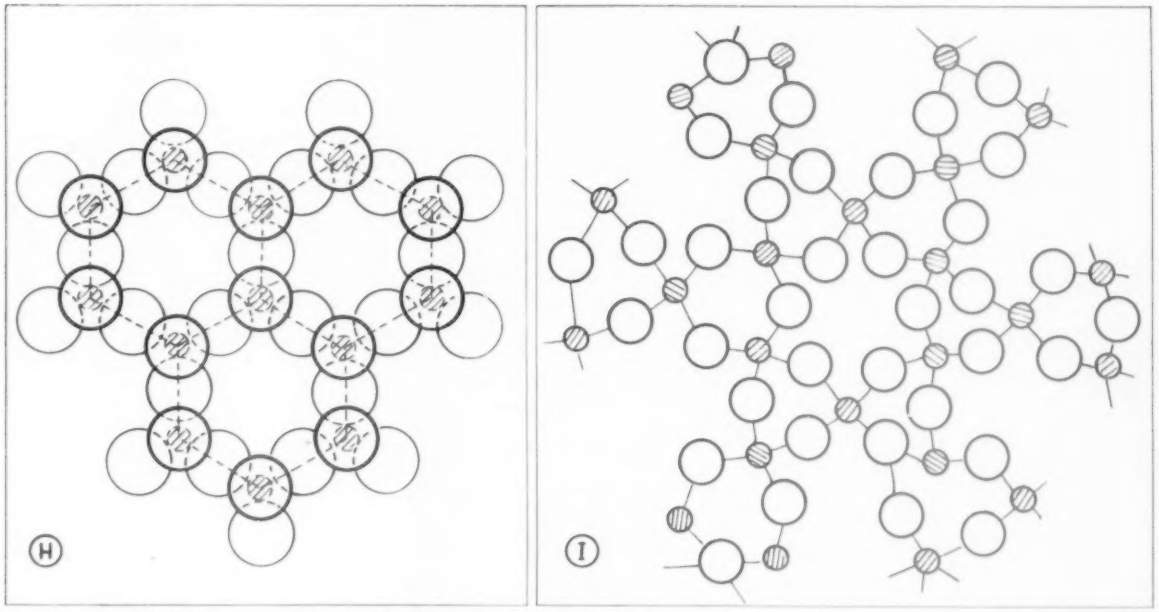
Phyllosilicates

The next step in the organization of silica tetrahedra (H) is the joining up of the hexagonal rings, or double chains, to form sheets. These are the Phyllosilicates, from the Greek word for leaf. They constitute a large and important group. The general type of formula is $A_m\ (B_2X_5)_n$. The Si_2O_5 or multiples of this unit are common to all the silicates in this group. The most important from a concrete aggregates angle are the Micas. Both Muscovite and Biotite are potassium, iron, magnesium and aluminum silicates in which some of the aluminum ions are in the tetrahedra lattice substituting for silicon, with the rest 6-coordinated like the magnesium or as some of the other cations other than silicon. Here, as in the chain lattices, the cations (positively charged ions) other than the silicon and aluminum in the tetrahedra lattices, serve merely to bind the sheets of tetrahedra together. A part of this inbetween binder course is made up of (OH) ions and water, which with their weak bonding property explain why the Micas cleave so readily into thin sheets or scales.

Obviously, from the very nature of its chemical structure, Mica makes a poor aggregate, and a considerable amount of it in any size of particle in any kind of rock detracts from the qualities of that rock as an aggregate. Also, of course, the potassium content is much more soluable than desirable in any mineral designed for permanency. A notorious example of how poor a Phyllosilicate can be in an aggregate is Montmorillonite, of which Beidellite is a variety. Concrete researchers will probably recall the classic papers (including the first to be published as an article in ROCK PRODUCTS) by G. F. Laughlin, of the U.S. Geological Survey, on the disintegration of concrete bridge abutments in Pennsylvania because the limestone aggregate contained a considerable percentage of Beidellite. Other concrete failures have been traced to the use of aggregates containing Montmorillonite type impurities. The Montmorillonites do not necessarily contain potassium or sodium but do contain a considerable number of water molecules and (OH) bonds, which make for wide spacings between the SiO_4 leaves. Such bonds between the "leaves" show a ready tendency to take in more water, and this expands the distances between the sheets, or leaves, thus resulting in destructive expansion of the concrete in which aggregates are contaminated with this impurity. These are "clay minerals" and they may be in limestones or other sedimentary rocks as clay impurities. Their properties are the same no matter how small the particle, and hence as an impurity in any rock are dangerous.

Tectosilicates

We now come to the largest and most important group among the silicates, the Tectosilicates (I). The general formula for these is $A_m(BX_2)_n$.



(H) Si_2O_5 groups forming continuous sheets—Phyllosilicates. (I) SiO_2—Tectosilicates (quartz is example). Three dimensional lattice. Sketch is intended to show type of bonding only

Thus when m is zero it cancels out the A and we have BX_2 or SiO_2, which is silica, or in its most common form, quartz. But this group also includes the feldspars which are about the most important of rock-building minerals. We will not say much here about either silica, which is worth a separate treatment for it has many interesting properties, or feldspar, which is a large subject. The commonest kind of silica is quartz because this form is the most stable at ordinary temperatures. In fact it is about the most stable common mineral because after many varieties of silicate rock dissolve away to form clays and ionic or colloidal solutions in river- and sea-water, the silica generally remains in sizable grains, with which we are all familiar as sand. It does dissolve slowly in waters that are alkaline, but such waters are not common where rocks are acidic or high in silica.

The Tectosilicates are three dimensional lattices in which every oxygen ion is bound to two silicon ions, so that the lattice as a whole has no unused $O^{=}$ charges to dispose of except where Al substitutes for Si. In other words the lattice, if SiO_4 tetrahedra alone, is neutral with positive and negative charges balanced, except those which occur on the outside of the particle or in pores and interior channels. If a particle of quartz is split, obviously one must break bonds between Si and O. The Si ion immediately grabs another O out of the atmosphere, or out of ever-present atmospheric moisture, or an (OH). The exposed O ion will also immediately grab an (OH), or a water molecule, by its H^{+} end or side. This accounts for the extraordinary affinity of silica for moisture, and no particle of sand is ever entirely free of an extremely thin film of moisture except when hot and dried at relatively high temperature.

The feldspars are too large a subject to tack on the end of this article, but they are important components of many aggregates—and in general they can hardly be said to contribute to durability. In another article we shall describe in some detail their chemical structures and the effect on them of both alkaline and acidic (mostly H_2CO_3) solutions (CO_2 in water).

Foreign Cement Production

Nicaragua: Compania Nacional Productora de Cemento, S.A., Nicaragua's only cement company, produced 475,851 bags of cement during 1951, compared with 387,260 bags in 1950, and 386,081 bags in 1949. Imports in 1951 were fairly high and exports small. The country is experiencing a construction boom, which accounts for the increased use of cement.

Nigeria: A cement plant is being built in the eastern region at Nkalagu (east of Enugu) which is expected to meet all Nigerian cement requirements. Imports of cement in 1951 totaled 261,057 long tons. The corporation building the plant was formed by Nigerian Coal Corp., Associated Portland Cement (U.K.), Belgian Cimentaries and Briquetteries Reunis (France).

Peru: Cement production reached a new peak in 1951, due mainly to the stimulus of accelerated government construction, but also because of increased private building. The Cia. Peruana de Cemento Portland, sole producer, reported an output of 2,160,925 bbl. in 1951, an increase of 11 percent over the previous record of 1,948,806 bbl., established in 1950. The installation of an additional kiln is expected to increase production approximately 33 percent by the end of 1952.

The new plant of Cia. Nacional de Cemento Portland del Norte, S.A., was expected to begin production by the end of 1952, at the rate of approximately 730,000 bbl. annually. This company, which was established in 1948, was delayed in initiating operations because of financing difficulties. Another new company, Cia. de Cemento Chilca, S.A., was recently organized by a group of prominent Peruvian businessmen. The new plant, which will be built at Chilca, about 43 miles south of Lima, is expected to begin production by the third quarter of 1953, at the rate of about 548,000 bbl. annually.

Turkey: Production of cement totaled 396,416 metric tons in 1951. Sales amounted to 392,372 tons, valued at T124,387,764 f.o.b. selling price. The rate of exchange is $1 U.S. equals T12.80.

Uruguay: Production of cement in 1951 by Uruguay's two plants totaled 301,057 metric tons, a slight decrease from the 305,479 tons produced in 1950. A new government-sponsored plant, to be built near Minas, is expected to be ready for operation by 1954. Capacity will be approximately 100,000 tons annually.

These reports were taken from *Mineral Trade Notes*, published by the Bureau of Mines.

Missouri Producers Discuss Legislation

Percentage depletion, conservation program, drilling and blasting, and aggregate testing were major topics for Missouri Limestone Producers Association

FOLLOWING THE PATTERN set at the last annual convention, Missouri Limestone Producers Association invited a large group of state highway

Paul McCarty, Monticello, left, and L. H. Bray, Rolla

engineers to the banquet climaxing its 8th annual convention held in Jefferson City, December 9-10, 1952. Prior to the banquet and cocktail party, the engineers were given the opportunity to participate in a panel discussion, along with the membership of the association, on the subject of selective quarrying. Estimates of aggregates requirements for Missouri's 10-year highway construction program were also aired at the time.

Membership meetings of the association covered latest developments in percentage depletion regulations, changes anticipated in the Agricultural Conservation Program and in the P.M.A., uses of crushed stone for various types of subbases, state legislation impending for amendments to the Mechanics Lien Law affecting agricultural limestone purchases, the truck cover law, and technical developments in quarrying methods. Presiding at the sessions were Buford V. Everett, association president, and Arthur R. Alvis.

Officers

Officers and three board members were elected at the business meeting. To serve as president for 1953 is Russell W. Hunt, Southwest Lime Co., Neosho. Vice-president is Arthur R. Alvis, Butler; Carl Partin, Milan, was re-elected secretary-treasurer. New board members are Albert Richardson, Gordon Quarries, Forest City; M. M. Green, Carrollton; and Joe Howard, Ozark. Board member terms are for three years. Board members whose terms expire at the end of 1953 are Keith Hall, Bunceton; Mr. Hunt, and Mr. Partin. Members whose terms expire in 1954 are J. J. Griesemer, Billings; Horace G. Krause, St. Louis, and Mr. Alvis. Paul Doll continues as manager of the association.

Retiring officers of the M.L.P.A. are Buford V. Everett, Everett & Clark, Plattsburg, president, and Charles E. Thomson, Dietz Hill Development Co., Kansas City, vice-president.

Percentage Depletion

Current status of percentage depletion regulations was one of the principal topics discussed by Robert M. Koch, executive secretary, National Agricultural Limestone Institute, Washington, D.C. Though many points have been settled regarding depletion benefits there is still a long way to go before a final answer is

Ray Howerton, Ashley Quarries, Inc., to the left, and Ray Clark, Everett & Clark, Plattsburg

reached, Mr. Koch said. The Bureau of Internal Revenue has issued a new interpretation of the basic depletion law which limits 15 percent benefits only to producers of chemical grade limestone. The ruling is being appealed, but Mr. Koch feels that too much is being expected of this appeal. In the first place, he pointed out, the appeal is being made to the same group which formulated the interpretation. Then too, since Congress's intentions are vague because of the writing of the law, the B.I.R. is taking a very conservative stand in making its interpretation.

Two paths are open if the appeal is turned down: the tax court, or a new law by Congress into which corrective legislation would be written. Mr. Koch expects the latter will be the case. N.A.L.I. is still recommending that agricultural limestone producers take the full 15 percent depletion allowance (instead of the 10 percent permitted in the ruling). Of course, if the producer's claim is disallowed he may have to pay back the difference, plus 6 percent interest. Another way of obtaining the benefit is to take the stipulated allowance for the type of stone, then file a claim for over-payment. This, however, is an invitation for the B.I.R. to examine the producer's entire situation, Mr. Koch pointed out. Then the speaker suggested a method which takes advantage of the law's 3-year statute of limitation and which he claimed is entirely legal. It is this: pay income tax allowing the "correct" amount of percentage depletion, then file an amended return and a claim for the full 15 percent two or three days before the three-year period specified by the statute of limitations has expired. This would be done each year, of course, covering the return filed three years previously. The amended return

New officers and board of directors of Missouri Limestone Producers Association. Left to right, standing: Keith Hall, Albert Richardson, Henry Andrae (association counsel), Horace G. Krause, M. M. Green and Joe Howard. Seated, left to right; J. J. Griesemer, Arthur R. Alvis, Paul Doll (manager), R. W. Hunt and Carl Partin

Panel discussion group. Paul Doll, moderator, (standing) ponders a question. Members of the panel, from left to right, are D. L. Robinson, bureau of materials and tests, R. J. Ervin, bureau of maintenance, L. F. Beckett, bureau of supplementary roads, all of the Missouri State Highway Department, and J. E. Gray, field engineer, National Crushed Stone Association

would include information on the overpayment of tax.

Horace Krause, chairman of the percentage depletion committee of N.A.L.I., outlined some other considerations of the depletion regulation. One thing that many producers have neglected to do, he said, is to establish the date when the operator took possession of the property, or else show proof of a lease to take sole possession of stone from the land. Full particulars must be filed with the tax return. Mr. Krause suggested that any operator who hasn't filed proof of ownership or lease should do so immediately rather than wait until filing the next return.

Some agricultural limestone producers are taking the full 15 percent allowance and then setting aside the difference between the 10 and 15 percent figures in a special fund, Mr. Krause said. Thus, in case the full amount is disallowed, funds would be available for repayment. In many cases these producers are buying government bonds or high grade securities, for the 6 percent interest the government charges on tax due can amount to quite a bit.

The attitude of the percentage depletion committee is to fight for full benefits. Rock asphalt and other producers are permitted 15 percent, so Mr. Krause said there is no reason why agricultural limestone should not be permitted the same allowance. Then too, the basic law says nothing about end use, whereas interpretations read this in. "Cut-off" points in material preparation, in which only certain steps are allowable in figuring depletion benefits, are equally as serious as end use in the interpretation of the law, Mr. Krause said.

Agricultural Conservation Funds

Mr. Koch, in discussing the Agricultural Conservation Program, predicted the Production and Marketing Administration in its present form will be abolished by the new Congress. However, he feels that the payment-type program will most likely be retained, though no one knows for sure about this. The new Secretary of Agriculture, Ezra Taft Benson, according to Mr. Koch, was chosen by Milton Eisenhower, younger brother of President-elect Eisenhower. It was Milton Eisenhower who planned the reorganization of the department in which the P.M.A. program was set up; it is this fact that leads Mr. Koch to the conclusion that there will be fewer changes in the department than many people think. However, since the administration will probably let the excess profits tax lapse and permit a 10 percent reduction in personal income taxes, some adjustments in payment-type programs may have to be made, the speaker observed. Authorizations for fiscal 1953 have already been made, therefore no cuts can be expected before 1954. There is a good chance that A.C.P. and the Soil Conservation Service will be combined at the county level. If "annual practices" slide as a result, Mr. Koch feels this would be corrected within 2-3 years. One thing that will certainly change is the personnel on state P.M.A. committees, since they are appointed by the Secretary of Agriculture.

Mr. Koch voiced opposition to the P.M.A. allocation method, by which a certain percentage of each state's funds must be used for so-called "permanent" type conservation practices (ponds, strip farming, contouring, drainage). He has found that many county committees are opposed also because the farmers don't like it. This method, the speaker said, has brought more discredit to the program than anything since the program started in 1936. He warned that it plays into the hands of those who want to reduce the scope of the program.

The speaker was asked if soil tests are very widespread and of much help. Mr. Koch replied that most states now use the tests, but that acceptance of the tests is gradually tying the hands of producers. If the test is stressed too much, eventually farmers will accept test results as a ceiling to the amount of limestone to be applied, regardless of needs apart from acidity correction. Then, Mr. Koch prophesied, producers will have to break down this idea fixed in farmer's minds.

Developments in the crushed stone industry, observed first-hand in his travels as field engineer for the National Crushed Stone Association, were described by J. E. Gray. He first explained to the group the Los Angeles abrasion test, sodium and magnesium sulfate soundness tests, freezing and thawing test, aggregate moisture limit and degree of saturation.

There is a growing use for crushed stone as a base under rigid pavements, the speaker said. The base is either dense and undrainable or loose and drainable. A flexible pavement uses materials according to strength; the bottom layer is composed of the weakest material, then stronger materials are used as the layers approach the surface. The purpose is to get depth to increase the bearing area on the soil. Economics is the reason for using the cheaper material on the bottom.

Mr. Gray described a super-compactor, a machine which is capable of compacting several feet of crushed

Banquet speaker was Dave Livingston, Washington, Iowa farmer-humorist. To the right of the speaker are R. W. Hunt, Ben P. Donnell, Horace G. Krause and Arthur R. Alvis

stone. The machine has been used in the construction of airports and the New Jersey Turnpike, and will be used for constructing an Indiana test road.

So-called crusher-run or rolled rock base courses are prevalent in the West, according to the speaker. Dense base courses for such roads call for a maximum of 1½-in. stone. In order for the stone to "set up" or bind, 50 percent must pass a No. 4 screen, and 12 percent minus 200-mesh material is necessary. A good approximation of the proper gradation required is given by Talbot's equation:

$$P = 100 \left(\frac{d}{D} \right)^{n}$$

where P = percent passing any given size,
d = given size,
D = maximum size of aggregate.

Drainable base course material should conform closely to Talbot's equation raised to the ½ power. Requirements for this type call for 2½-in. maximum size stone, 30 percent through a No. 4 screen and less than 5 percent passing 200 mesh.

It is for dense bases that there is a big market for fines, Mr. Gray said, both for highways and railroads. It is much more effective than large size alone, since the latter have a tendency to pump. Proper use of water and fines and compaction equipment has resulted in crushed stone roads that look much like concrete, he mentioned.

Developments in drilling and blasting were reviewed by the speaker. For primary drilling high speed percussion units are frequently used for plus 4-in. dia. holes, and rotary drills using tricone bits have replaced churned drills significantly. The rotary drill seems to hold some preference except when chert is present in the deposit. As for blasting, Mr. Gray stated that millisecond delay methods have meant more to the industry than any other development. As an illustration of the economics effected, the speaker told of a producer he had visited who was enabled to use seven times as much explosive and get ⅛ the vibration by adopting delayed blasting. His secondary blasting was also reduced.

The biggest development in secondary breakage has been the use of shaped charges. Chief objection to these is their noise. The use of the dropball for secondary breakage has as many advocates as opponents, Mr. Gray related. Success depends upon the skill of the operator. Mr. Gray described a new drill, now undergoing tests, which eliminates the need for a man having to climb over a stone pile with a jackhammer. This consists of a three-wheeled carriage with a boom on which is mounted a drifter drill. Behind the drill (and on the boom) is the operator's chair, from which he guides all movements of the boom and drill by hydraulic controls.

A trend has developed to installing the primary crusher on the quarry floor, a method which shortens haulage distances and gives room for a surge pile. Here Mr. Gray has found a sharp difference of opinion: many operators think that quarry truck haulage even up grade is more economical than other methods. Surge pile value seems to vary with geographical location. Southern operators running steadily the year around like them since a breakdown will still leave material for processing through part of the plant. Northern operators, on the other hand, with the enforced winter period of shutdown during which plants are rebuilt and put in condition for the temperate season, find surge piles of lesser value, Mr. Gray related.

Missouri Legislation

The association's attorney, Henry Andrae, led a discussion of the state's truck cover law, which the governor had vetoed. This law required haulers of crushed stone and agstone to cover loads while traveling on the highway to prevent damage to vehicles and injury to people. The opinion of most members of the association in attendance was that support should be given to a new law which would embody some improvements. It was suggested that the new law limit requirement of truck covers to a certain maximum size of stone. Another member felt that the new law deserved support if operators will be given 6 months to a year to equip for it. The law should also include provisions for adequate sideboards on trucks, particularly for hauling minus ½-in. stone, advised a member. Also, much spillage could be avoided if operators were to clean up the truck body. The answer to the need for a good cover material, one member said, is a canvas tarpaulin lined with rubber latex. This is relatively inexpensive and long lasting.

Mr. Andrae continued with a discussion of other legislation affecting producers. Of great importance was the reduction, effective December 1, of the rate quarrying operators must pay for workmen's compensation. This decrease of 92¢ per $1000 of payroll reflected the improved safety record of Missouri quarries.

One of the principal topics discussed was the proposed state lien law. This is an amendment to the Mechanics Lien Law which would place a lien on farmland on which agstone has been spread. The new law will require the consent of the owner of the land if a tenant wishes to spread agstone or fertilizer. One member felt that if a tenant has made all decisions in the past and has added agstone or fertilizer for maintenance, the owner should be required to pay even though he didn't order it. Most members felt that it will be practically impossible to place restrictions in a bill requiring an owner to pay for services he didn't order, and that it is the prerogative of an owner to keep up his land or let it go to pot.

The Mechanics Lien Law now in effect in Missouri was described. It calls for filing a claim six months after a bill is due for work completed. It was suggested that it would be helpful to extend this limit to one year in the case of agstone since a crop failure may affect a farmer's ability to pay before the next crop comes in. The membership voted to place the study of the amendment in the hands of the board of directors and empowered that body to introduce legislation in the state legislature.

Panel Discussion—Selective Quarrying

Members of the panel represented the Missouri State Highway Department and the National Crushed Stone Association. From the highway department were D. L. Robinson, Bureau of Materials and Tests, Leo F. Beckett, Bureau of Supplementary Roads, and R. J. Ervin, Bureau of Maintenance. Mr. Gray represented N.C.S.A. Paul Doll was moderator.

(Continued on page 190)

Left to right: Paul Doll, association manager, Buford Everett, Everett & Clark, Plattsburg, retiring president, and Horace G. Krause, Columbia Quarry Co., St. Louis

SYMPOSIUM on the Chemistry of Cement

Meeting in London, England draws world-wide representation to discuss latest developments in cement chemistry and concrete design and construction

By W. C. HANSEN*

THE THIRD INTERNATIONAL SYMPOSIUM on the Chemistry of Cement was held in the Royal Institution in London during the week of September 15. The First International Symposium to deal solely with the chemistry of cement was held on January 14, 1918, when the Faraday Society arranged a meeting in London to discuss "The Setting of Cements and Plasters." The second was held in 1938 when the Royal Swedish Institution for Engineering Research and the Swedish Cement Association invited a number of research chemists to a meeting in Stockholm.

Registration at this Third Symposium was over 200. The countries represented were Australia, Belgium, Canada, Denmark, Egypt, Eire, Finland, France, Germany, Greece, Holland, India, Israel, Italy, Japan, Luxembourg, New Zealand, Norway, Pakistan, South Africa, Spain, Sweden, Switzerland, United Kingdom, and the United States. The United States was represented by: R. H. Bogue, Portland Cement Association Fellowship; H. K. Cook, U. S. Army, Corps of Engineers; M. Grasso, Portland Cement Association Fellowship; W. C. Hansen, Universal Atlas Cement Co.; H. Insley, National Bureau of Standards; G. L. Kalousek, University of Toledo; W. Lerch, Portland Cement Association; M. A. Swayze, Lone Star Cement Corp.; and C. E. Wuerpel, Marquette Cement Manufacturing Co.

The meeting was sponsored jointly by the Building Research Station of the Department of Scientific and Industrial Research and the Cement and Concrete Association. Sir Ben Lockspeiser, secretary, Department of Science and Industrial Research, and Sir Francis Meynell, director, Cement and Concrete Association, president and vice-president, respectively, of the Symposium, gave the welcoming addresses on the afternoon of September 15. These were followed by an introductory address by Professor H. LaFuma, of France. Professor G. Wastlund, of Sweden, then gave a short survey of the fundamental research on cement and allied materials being carried on at the Swedish Cement and Concrete Institution.

Messrs. P. Gooding and P. E. Halsted, of the Cement and Concrete Association, reviewed the early history of cement in England. The authors touched upon the controversy regarding who actually should be credited with being the first producer of portland cement. In this, they reviewed the work of Smeaton, Parker, Frost, Pasley and Johnson. They also described the types of kilns used in the early days and some of the first structures built with portland cement.

Constitution of Portland Cement

The second day of the Symposium was occupied with the presentations and discussion of seven papers on the constitution of portland cement. In this review of the papers, no effort will be made to separate the discussions from the main paper.

J. W. Jeffrey, Birkbeck College, University of London, started the session with a paper entitled "The Tricalcium Silicate Phase." From results of powder x-ray investigations, single crystal x-ray investigations, thermal analysis, and optical investigations, it is concluded that the component in portland cement clinker named "alite" by Törnebohm has the composition $54CaO{\cdot}16SiO_2{\cdot}MgO{\cdot}Al_2O_3$. This may be visualized as $3CaO{\cdot}SiO_2$ containing some uncombined CaO, in which one mole of CaO has been replaced by one mole of MgO and which has taken into solid solution one mole of $3CaO{\cdot}Al_2O_3$. In the case of high-iron cements, the $3CaO{\cdot}Al_2O_3$ content of alite may be less than one mole. Strength tests with pure $3CaO{\cdot}SiO_2$ and alite showed only minor differences between the two. Three forms of tricalcium silicate—pure $3CaO{\cdot}SiO_2$; $3CaO{\cdot}SiO_2$ containing small amounts of FeO, Fe_2O_3, MnO, P_2O_5, MgO and Al_2O_3, obtained from basic slag; and alite ($3CaO{\cdot}SiO_2$ containing small amounts of MgO and Al_2O_3) have been studied and found to have a rhombohedral pseudo-structure.

R. W. Nurse, Building Research Station, presented the paper on "The Dicalcium Silicate Phase." It is now agreed that four polymorphic forms (γ, α', α and β) of $2CaO{\cdot}SiO_2$ occur in the temperature range of 0-1600 deg. C. The crystal structure of the β form stabilized with CaO and B_2O_3 has been determined on single crystals. Progress is being made on the determination of the crystal structure of the other forms. All evidence points to the conclusion that the $2CaO{\cdot}SiO_2$ in portland cements is the β form, which probably contains minor amounts of some of the other compounds in solid solution.

W. C. Hansen

"The Interstitial Phases in Portland Cement Clinker" were discussed by Herbert Insley, National Bureau of Standards. These consist of glass, crystalline "dark" and "light" material, free MgO and free CaO. The diffraction attributed to glass in clinker is probably that of an unstable ferrite. The light interstitial material is ferrite and the dark interstitial material is assumed to be a form of tricalcium aluminate, unkown in the pure state, stabilized by alkali compounds in solid solution. The nature of the interstitial materials is influenced by rate of cooling of the clinker and the viscosity of the liquid in the clinker.

G. L. Malquori, Instituto di Chimica Industriale dell 'Universita di Napoli, Italy, and V. Cirilli, Instituto di Chimica Applicata del Politecnico di Torino, Italy, presented a paper on "The Ferrite Phase." It is agreed that solid solutions richer in Al_2O_3 than $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$ occur, but there is not complete agreement on the formula $6CaO{\cdot}2Al_2O_3{\cdot}Fe_2O_3$ as the end member in this series of solid solutions. A magnetic fraction separated from powdered cement and subjected to x-ray analysis provides a means of estimating the composition of the ferrite phase. Such analyses gave composition of $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$ for two clinkers, $6CaO{\cdot}2Al_2O_3{\cdot}Fe_2O_3$ for two, and compositions between $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$ and $6CaO{\cdot}2Al_2O_3{\cdot}Fe_2O_3$ for four others. A partial structural study has established a pseudo-tetragonal unit cell for $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$. Evidence was presented for the existence of the compound $4CaO{\cdot}Al_2O_3{\cdot}Mn_2O_3$ and for a complete series of solid solutions between this compound and $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$.

*Manager of Research Laboratories, Universal Atlas Cement Co.

"The Alkali Phases" in portland cement clinker were covered in a paper by T. F. Newkirk, Portland Cement Association Fellowship. During burning, the alkalies react preferentially with SO_3 to form alkali sulfates. Alkalies in excess of the molar equivalent of SO_3 react with the major clinker components to form $Na_2O{\cdot}8CaO{\cdot}Al_2O_3$ and $K_2O{\cdot}23CaO{\cdot}12SiO_2$. There is evidence that the alkali-bearing phases hydrate rapidly and, accordingly, contribute to the development of early strength in cement products.

"Tricalcium Aluminate" was the title of a paper by Fred Ordway, Portland Cement Association Fellowship. Various procedures for growing single crystals were discussed, and the approximate crystal structure of pure $3CaO{\cdot}Al_2O_3$, determined from a single crystal, was given. The studies have not progressed to the point of determining the extent to which the $3CaO{\cdot}Al_2O_3$ phase in portland cement differs from the pure compound.

R. H. Bogue, Portland Cement Association Fellowship, in a paper entitled "Studies on the Constitution of Portland Cement Clinker," discussed the various graphical and mathematical means available for representing the phase relations in polycomponent systems. This paper also dealt with some of the new experimental techniques being used in the study of the constitution of portland cement.

Setting and Hardening Studies

The second day of the Symposium was given over to papers on the setting and hardening of portland cement. The first paper, "The Structures of Cement Hydration Compounds" by J. D. Bernal, Birkbeck College Research Laboratory, London University, reported crystal structure studies on natural and synthetic hydrated calcium silicates. Single crystals of two such compounds suitable for x-ray studies have been grown in high pressure bombs. These are $2CaO{\cdot}SiO_2$ alpha hydrate and afwillite, $3CaO{\cdot}2SiO_2{\cdot}3H_2O$. The cell dimensions have been partially or completely determined for ten natural and synthetic hydrated calcium silicates. For the most part, these compounds crystallize as needles, which suggests that the theory suggested for the setting of plaster of Paris where needle-shaped crystals of $CaSO_4{\cdot}2H_2O$ are formed may be applicable to the setting of portland cement paste, the principal difference between plaster and cement being the much greater coarseness and softness of the sulfate as against the silicate. The fineness of the silicate crystals forms what has previously been known as a gel. Attempts to prepare hydrated calcium silicates at atmospheric pressure and temperatures up to 100 deg. C. gave two products which have been identified as CaO 1 to 1.5 SiO_2, H_2O 2.5 to 1.0 and $2CaO{\cdot}SiO_2{\cdot}H_2O$ 4 to 2. X-ray and physical chemical study of the hydration compounds of cement leads to the conclusion that crystalline forms similar to one or both of these compounds are found in these products.

Harold H. Steinour, Portland Cement Association, Chicago, Ill., in a paper entitled "The Reactions and Thermochemistry of Cement Hydration at Ordinary Temperature," reviewed the literature on this subject and pointed out the many problems to be solved in this field. Discussion developed that solid solutions of $4CaO{\cdot}Al_2O_3$ with $4CaO{\cdot}Fe_2O_3$ and of $3CaO{\cdot}Al_2O_3{\cdot}3CaSO_4{\cdot}Aq.$ with $3CaO{\cdot}Fe_2O_3{\cdot}3CaSO_4{\cdot}Aq.$ are capable of existence and may occur in hydrated portland cement; also, that the study of dehydration isobars can yield valuable information on hydration products of cement. Evidence was presented that indicate the hydrated calcium silicate phase in portland cement paste may be a solid solution of $2CaO{\cdot}SiO_2{\cdot}nH_2O$ and $5CaO{\cdot}4SiO_2{\cdot}nH_2O$.

"The Reactions of Cement Hydration at Elevated Temperatures" was presented by G. L. Kalousek, Research Foundation, The University of Toledo. From differential thermal analysis of products in the system $CaO{\text-}SiO_2{\text-}H_2O$ and of hydrated cement with and without added SiO_2 heated at elevated temperatures under pressure, it is concluded that autoclaved hydrated cement pastes without added silica consist primarily of $CaO{\cdot}SiO_2{\cdot}H_2O$ alpha hydrate and calcium hydroxide. The alpha hydrate has a variable composition in the range 1.8 to 2.4 $CaO{\cdot}1.00SiO_2{\cdot}1.0$ to 1.25 H_2O. When silica is added to the cement, the ratio of CaO to SiO_2 varies between 2.4 to 0.9 CaO to 1.00 SiO_2. Other phases, such as $3CaO{\cdot}Al_2O_3{\cdot}6H_2O$ and $3\ CaO{\cdot}Al_2O_3{\cdot}3CaSO_4{\cdot}31H_2O$, are not detected by thermal analysis in these autoclaved products, and it is suggested that the components, such as Al_2O_3 and Fe_2O_3, have entered the structure of the alpha hydrate to give a homogeneous solid solution phase.

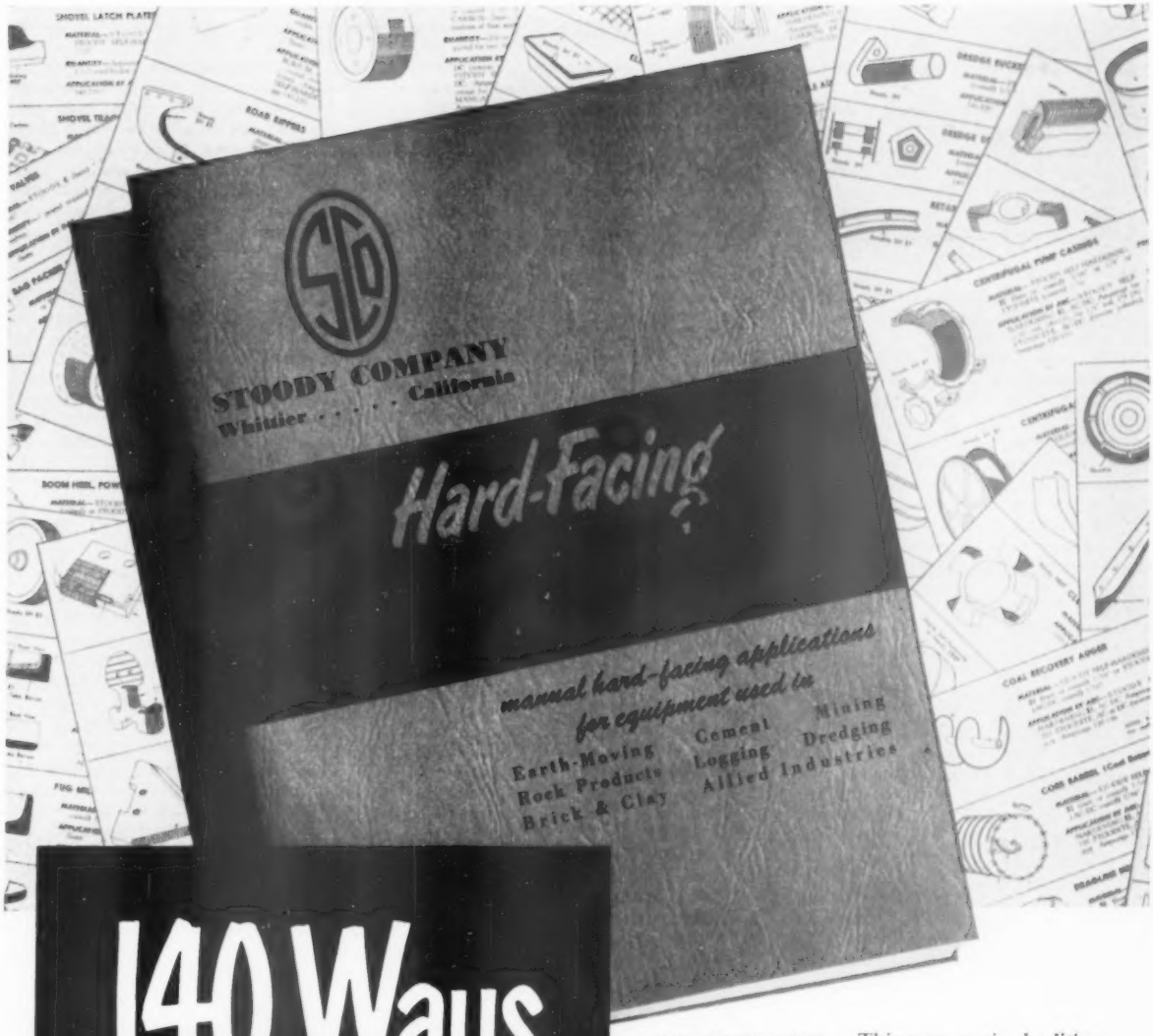
"The Physical Structure of Cement Products and Its Effect on Durability" by F. E. Jones, Building Research Station, Walford, England, reviewed the literature on the structure of the hardened cement paste and its influence on durability. The total water in hardened cement paste is classified as water of constitution, adsorbed water and capillary water. Water in the last two classes is responsible for the volume change of concrete during wetting and drying and for the destruction of concrete by freezing and thawing. Various theories of the mechanism by which freezing harms concrete were described. The effects of aggregates on durability from the standpoint of such properties as thermal expansion and diffusivity, strength, porosity, surface texture and shape were also discussed, as were the effects of factors such as mix design, placing and atmospheric corrosion.

"Chemical Aspects of the Durability of Cement Products" by T. Thorvaldson, University of Saskatchewan, Canada, was the last paper in this group. The work on the resistance of mortars made from the pure cement minerals and from cements of varying compositions to attack by sulfates was reviewed. Information on hydrothermal reactions of the cement compounds was studied as a basis for an explanation of the increased resistance to sulfate action produced by autoclaving silica sand mortars. It was suggested that this increased resistance is due to the prevention of the formation of reactive $4CaO{\cdot}Al_2O_3{\cdot}13H_2O$ and to the lowering of the concentration of $Ca(OH)_2$ by virtue of its reaction with silica to form a hydrated calcium silicate phase.

Special Cements

Special cements were discussed on the third day. The first paper, "The Constitution of Aluminous Cement," was given by T. W. Parker, Building Research Station, Walford, England. The phase found in these cements and formerly identified as unstable $5CaO{\cdot}3Al_2O_3$ was found to be the quaternary compound $6CaO{\cdot}4Al_2O_3{\cdot}FeO{\cdot}SiO_2$. This compound is isomorphous with the compound $6CaO{\cdot}4Al_2O_3{\cdot}MgO{\cdot}SiO_2$. A method was developed for calculating the potential compound compositions of these cements in terms of $CaO{\cdot}Al_2O_3$; $6CaO{\cdot}4Al_2O_3{\cdot}FeO{\cdot}SiO_2$; $12CaO{\cdot}7Al_2O_3$; $2CaO{\cdot}SiO_2$; $2CaO{\cdot}Al_2O_3{\cdot}SiO_2$ and ferrite. The ferrite phase may be $6CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$; $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$; $6CaO{\cdot}Al_2O_3{\cdot}2Fe_2O_3$; or $2CaO{\cdot}Fe_2O_3$. Certain of these cements have been found to contain $CaO{\cdot}2Al_2O_3$. Single crystals of this compound separated from aluminous cement have been used to obtain the crystal structure of this compound.

F. Kiel, Forschungstenstitut der Zementindustrie, Düsseldorf, Germany, presented a paper on "Slag Cements". Three different types of slag cements are produced. These are portland slag-cement; slag-portland cement; and slag-sulfate cement, the first named component in each case being the principal one. The best way of testing the suitability of a slag for use in cements is by a direct test with portland cement but the glass content as determined by microscopic study may be used as an index of the quality of the slag for this purpose. A product known as Trief Slag Cement is produced by wet grinding slag with portland cement clinker and catalysts. This cement must be used immediately, but it is possible to store the wet ground slag after drying for incorporation later with cement and catalysts. Progress was reported on the use of the polaro-



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graph as a means of quickly analyzing slags.

"Expansive Cements" were discussed by H. LaFuma, Centre d'Etudes et de Recherches del' Industrie des Liants Hydraulique, Paris, France. Attempts have been made to produce a cement in which the expansion could be controlled in such a way as to offset the shrinkage which occurs when concrete products dry. In these attempts, the expansive agent has been a sulfoaluminate clinker made by burning a mixture of gypsum, bauxite and limestone. The cement is produced by grinding this clinker with portland cement clinker and blast-furnace slag. Another method is to use a mixture of calcium aluminate cement and gypsum as the expanding agent. It is possible to produce fairly well controlled expansions by the proper blending of materials and control of curing conditions, but the subsequent shrinkage during drying has not been satisfactorily controlled.

"Oil Well Cements" were discussed by W. C. Hansen, Universal Atlas Cement Co. The cementing operation and the development of testing procedures were described. These cements are produced by either using a clinker with a very low potential $3CaO \cdot Al_2O_3$ content or by adding materials, generally organic compounds to coarsely ground Type II cement, which retard the rate of reaction of the cement with water at elevated pressures and temperatures. The former are usually referred to as slow-set cements and the latter as retarded oil well cements. Other special cements used in the oil industry were discussed and the patent literature on these cements was reviewed. Data were presented showing the effects of elevated temperatures and pressures on the rates of hydration of cements and on the strengths obtained.

In a paper "Masonry Cement" by Charles E. Wuerpel, Marquette Cement Manufacturing Co., the need for additional specifications for this type of cement was stressed because of excessive expansions obtained in structures in which cements composed of portland cement and high magnesian limes were used. Data were presented for 20 masonry cements to show the wide variations in the physical properties of these cements and in the mortars produced from them. Various testing methods were discussed.

Applied Research

The final day of the Symposium was devoted to papers on the application of research. The first of these, "Thermodynamics of the Cement Kiln" by H. Gygi and F. Guge, Holderbank-Wildegg Cement Works, Ltd., Holderbank-Wildegg, Switzerland, developed the mathematics required in calculating the heat balance in both wet and dry process kilns. The need for the conservation of fuel through the fullest utilization of the heat generated in a cement kiln is particularly important in many of the European countries. For this reason, they have been especially active in developing efficient coolers and preheaters. A new preheater was described.

The title of a paper by T. Heilmann, F. L. Smidth & Co., Copenhagen, Denmark, was "The Influence of the Fineness of Cement Raw Materials on Their Burnability." Burnings were made on nodules 12 mm. in diameter which were first calcined for 30 min. at 950 deg. C. and then transferred direct to the kiln for final burning, where they were generally burned for 20 min. at varying temperatures. Variations of size of nodules up to 25 mm. had no effect upon the results. Larger nodules required longer burning times. A mix with a high lime saturation factor should not contain more than 0.5 percent coarse silica above 0.2 mm. The coarse silica is converted to $2CaO \cdot SiO_2$ but not to $3CaO \cdot SiO_2$. Up to 5 percent of pure calcite particles above 0.15 mm. is permissible in the kiln feed and, when the limestone particles contain argillaceous materials, greater amounts of coarse particles are permissible. About 35 percent material below 15 microns seems to be necessary for reasonable burnability, but this amount is always present when hard materials are ground in either open or closed circuit mills.

"Some Recent Developments in the Design and Construction of Concrete" was the title of a paper by A. R. Collins, Cement and Concrete Association, London, in which the author commented on the improvements in the structural field resulting from the use of shell roof construction and of prestressed concrete. In the field of concrete making, improved mix design methods and quality control have resulted in considerable gains in the effective strength of concrete in structures. In the construction technique, air entrainment, precasting structural concrete and textured surface finishes are important relatively new developments.

M. A. Swayze, Lone Star Cement Corp., in a paper entitled "Development of Cements for Special Uses in the United States," described the procedures followed in A.S.T.M. and the federal government in developing specifications for new cements. This covered the history of the development of the specifications for five types of cement by A.S.T.M. He also described the work being carried on in the development of specifications for special cements, such as oil well, masonry and pozzolana cements.

Dr. F. M. Lea, director, Building Research Station, Walford, England, in the closing address entitled "Cement Research and the Future," discussed some of the past accomplishments of scientists and engineers in developing cement and concrete and in determining the compounds involved and the manner in which they react with water to provide the cementing material of concrete. He also outlined many problems which remain to be solved and gave his audience a glimpse of what might be expected in the future.

The delegates to the Symposium were given opportunities to visit the following: Building Research Station, Walford; Research Station of the Cement and Concrete Association, Wexham Springs; Birkbeck College, University of London, London; Research Laboratory of Associated Portland Cement Manufactures, Greenhith; and the cement plant of Tunnel Portland Cement Co., Ltd., Pitstone.

Annual Gypsum Association Report

THE GYPSUM INDUSTRY reached near-record production levels in 1952 and expects its markets to hold firm in 1953, according to Lloyd H. Yeager, general manager, Gypsum Association, in his 1952 annual report.

Although complete production figures for the last quarter of 1952 were not available at the time of his report, Mr. Yeager estimated that gypsum board and lath production would amount to about 5.75 billion sq. ft. for 1952, compared with 5.8 billion sq. ft. in 1950, the record year for homebuilding starts. He also reported that more gypsum building products—lath, sheathing and wallboard—are being used in residential construction than ever before in history, adding that gypsum producers are gearing production for 1,000,000 home starts in 1953. The industry is encouraged also, he reported, by government bureaus' forecasts of expansion in non-residential construction which is using increasing amount of gypsum lath and lightweight plaster fire-proofing systems for light steel frame.

Another gypsum product which is expected to find increased use is the new factory-mixed lightweight aggregate plasters which are highly fire-resistant and eliminate the necessity of mixing plaster on the job site.

A greater demand for gypsum lath is also anticipated because of an increasing use of studless 2-in. solid gypsum lath partitions. Gypsum sheathing and wallboard are also expected to be in greater demand, due partly to the national upsurge in remodeling and expansion of existing homes.

As evidence of the gypsum industry's phenomenal growth during the past 50 years, Mr. Yeager noted that more than 11,000,000 tons of gypsum rock were mined in 1952 to meet industry demands, compared with less than 1,000,000 tons at the start of the century.

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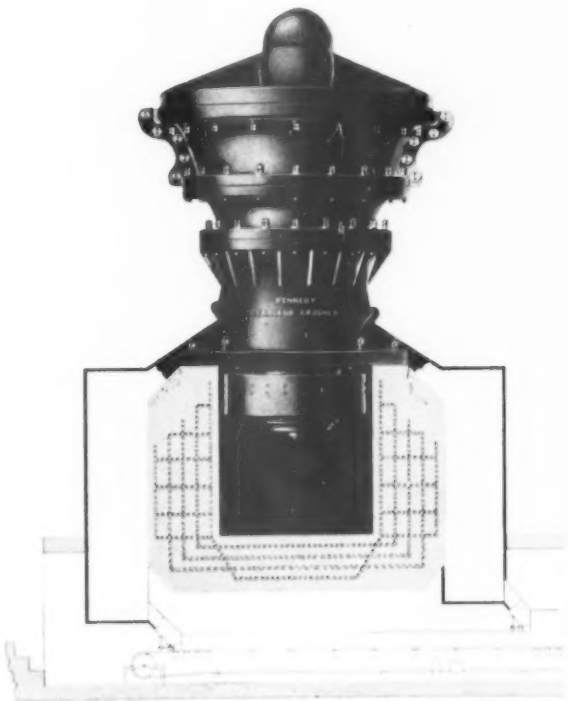

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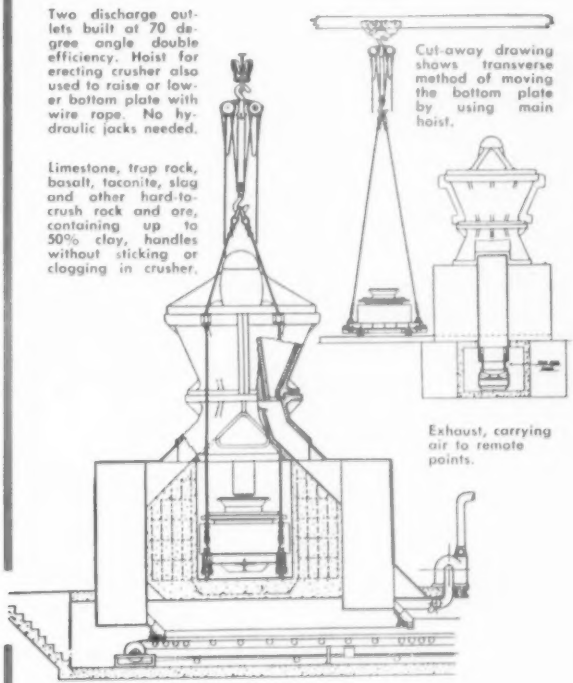
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Developing New Markets For Slag

National Slag Association annual meeting reports on expanded slag studies, renegotiation, exemption, O.P.S. decontrol, and safety competition

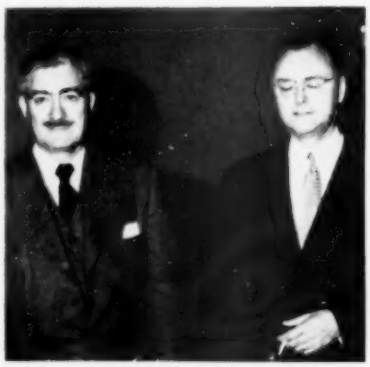
THE THIRTY-FIFTH annual meeting of the National Slag Association held at the Mayflower Hotel, Washington, D.C., November 12 and 13 was well attended, and an interesting program was provided with many industry problems discussed.

The first session on Wednesday morning was devoted to the report of the director of research, Fred Hubbard, and the report of the managing director, E. W. Bauman.

Mr. Hubbard discussed his participation in the work of Committee 613 of the American Concrete Institute on Proportioning of Concrete Mixtures. In connection with a proposed revision of the existing standards, extensive tests are being conducted in the laboratory of the National Slag Association to determine whether suggested changes are workable insofar as they affect proportioning of slag concrete. Some 60 different concrete mixtures containing coarse aggregates having maximum sizes of ⅜, ½, ¾, 1, 1½ and 2 in. are involved. The industry is being called on rather frequently for information concerning the proper proportions when using small sized aggregate, especially the ⅜-in. and ½-in. maximum sizes. Heretofore very little work had been done in the laboratory concerning these sizes, and when the present investigation is completed it is hoped that the proper recommendations for proportioning concrete with smaller size slag will be available. There is a probability that the present Concrete Proportioning Tables recommended by the association, and printed by Lefax (latest issue, reprint June, 1942), may be revised on the basis of results obtained from this extensive investigation.

Expanded Slag Studies

Another problem that has been receiving more than usual attention relates to expanded slag. Mr. Hubbard reported that a rather comprehensive investigation was made during 1952 to determine the physical and chemical characteristics of expanded slag from all known sources in the United States, as well as two in Canada. Data developed from this study were made available to the Underwriters' Laboratories, Inc., in connection with fire tests made by that organization on 8-in. bearing walls of slag concrete masonry units. Results of the Underwriters' Laboratories tests were reported July 1, in Retardant Report 3460-1-2-3, and these are now available as information to the general public. It was reported that probably



President C. A. Barinowski, to the left, and vice-president R. O. Dierker

the outstanding feature of the fire tests was the results obtained when filling the cores of standard hollow masonry units with expanded slag. Modular units, 8- x 8- x 16-in. nominal size with a 1¼-in. face shell thickness, having a core volume of approximately 43 percent, were only given a 2-hr. rating when tested with the cores unfilled, but these same block developed a 4-hr. rating when the cores were filled with expanded slag. In view of the excellent fire-resisting rating obtained, as well as increased insulation properties, it was recommended that it would be an important improvement if more emphasis would be placed in recommending to engineers and architects the construction practice wherein cores of hollow masonry units be filled with expanded slag.

Inasmuch as lightweight aggregate concrete is coming into greater use, the association contemplates an investigation involving expanded slag in structural concrete. It is planned to use slag from three sources in this investigation, representing the light, medium, and heavy range materials. The program, when finally outlined, will follow the pattern of tests used by the U.S. Bureau of Standards and the Bureau of Reclamation for their rather intensive investigation on "Lightweight Aggregate Concrete," the results of which were reported in a bulletin published by the Housing and Home Finance Agency.

Grant Renegotiation Exemption

The managing director, in his report, advised the members that in some respects the year 1952 was rather outstanding from the standpoint of major projects completed. One of the important accomplishments relates to the decision granted the slag industry by the Renegotiation Board, whereby the commodity was exempted from renegotiation. Philip Nichols, Jr., chief counsel of the Renegotiation Board, issued an interpretation in a letter addressed to the association, thereby removing any question as to the status of slag in relation to the Renegotiation Act of 1951.

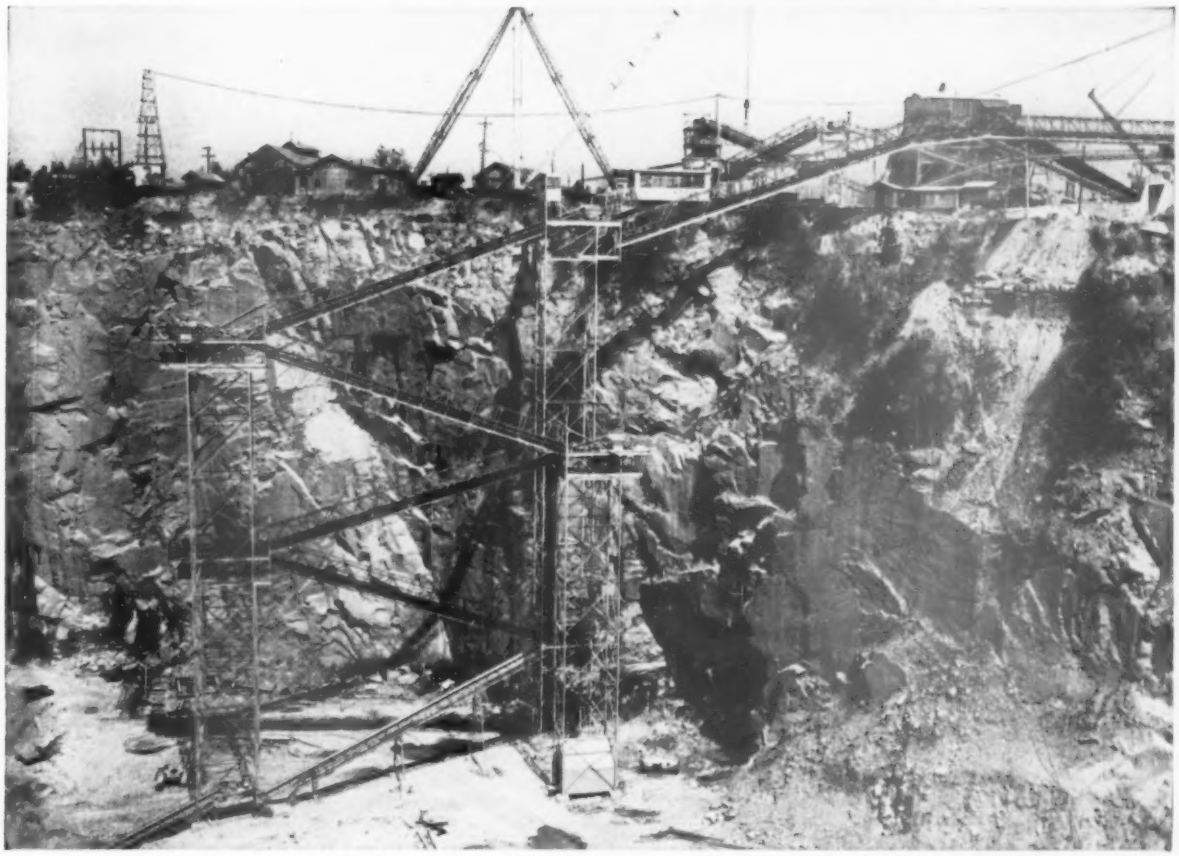
A project reported on as being rather outstanding, inasmuch as it involved cooperative effort between the technical staff of the Portland Cement Association and the association's Technical Problems Committee was the issuance by the P.C.A. of a revised pamphlet on "Design and Control of Concrete Mixtures"—Tenth Edition.

The association has prepared a slag catalog which will be carried in Sweet's 1953 Architectural File Service. This project represents the major effort of the association in its advertising and publicity program for the

(Continued on page 202)

To the left, G. A. Mattison, Jr., and W. E. Bliss greeting E. W. Bauman, managing director, and Dr. H. F. Kriege

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



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Rocks ride rubber escalator to cut conveying costs

B. F. Goodrich conveyor belts solve rock-handling problem

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RUBBER FOR INDUSTRY

Crushed Stone Association Program for Annual Meeting

THE NATIONAL CRUSHED STONE ASSOCIATION will hold its 36th annual convention at the Hotel New Yorker, New York, N.Y., February 2-4, 1953. On Sunday, February 1, preceding the general membership meeting, the Manufacturers Division Board of Directors will meet at 10:00 A.M. and the N.C.S.A. Board of Directors at 2:00 P.M.

The following convention program has been scheduled:

Monday, February 2

The convention will be opened with the movies "Paving the Angles" and "Proving Ground Test Activities," followed by a welcoming address by H. C. Krause, association president, and announcement of elections by the Board of Directors. Reports on business conditions during 1952 and the outlook for 1953 will be summarized by the regional vice-presidents and presented by the president. Also scheduled are reports of the association staff: engineering director, A. T. Goldbeck; field engineer, J. E. Gray; and administrative director, J. R. Boyd. Following the reports, Harry Bowser, director of sales education, Sloane-Blabon Corp., New York, N.Y., will give a speech of particular interest to salesmen.

A "greeting luncheon" will be held at 12:30, at which Milton Bacon, philosopher and humorist, will be guest speaker.

The afternoon session will be primarily for operating men and equipment manufacturers. "Heated Screens —Their Design, Application and Performance," will be discussed by John V. Owens, vice-president, Eastern Rock Products, Inc., Utica, N.Y. Other speakers will be T. W. Jones, production manager, New Haven Trap Rock Co., New Haven, Conn., who will speak on "Mechanics of Establishing and Operating a Good Safety Program in a Small Operation"; and Dr. L. Don Leet, associate professor of seismology, Harvard University, on "Recent Practical Developments in the Field of Delay (Quarry) Blasting."

Tuesday, February 3

The morning session will again be opened by a movie, "The Open Road," followed by N.C.S.A. committee reports. Russell Rarey, chairman, N.C.S.A. Percentage Depletion Committee, will discuss the latest developments in percentage depletion. "Modern Construction of Pavement Bases with Crushed Stone" will be the topic of a speech given by Charles E. Proudly, chief materials and test engineer, North Carolina State Highway and Public Works Commission. This talk will be illustrated by slides and will be followed by a color moving picture, demonstrating construction methods.

The Manufacturers Division will hold its annual luncheon business meeting at 12:30.

An address by a representative from Gall, Lane and Howe, N.C.S.A.'s general counsel, will open the afternoon session. "Application of the Percentage Depletion Regulations to the Crushed Stone Industry" will be discussed by a representative of the National Resources Division, Bureau of Internal Revenue. L. R. Boulware, vice-president in charge of employe relations, General Electric Co., Schenectady, N.Y., will speak on "Employer-Employe Relations."

In the evening there will be a dinner and meeting of the Accident Prevention Committee.

Wednesday, February 4

The morning session will be primarily for operating men and equipment manufacturers. A sound-color movie, "Gunning the Flyways," will be shown, followed by a session on operating problems, which will include: pictorial presentations of quarry operations by slides and moving pictures; and a discussion on "Churn Drilling Vs. Rotary Drilling," led by James H. Grove, Jr., manager, M. J. Grove Lime Co., Frederick, Md., on churn drilling, and E. A. Heise, superintendent, Columbia Quarry Co., St. Louis, Mo., on rotary drilling.

A general luncheon will be held at 12:30 with Clayton Rand, editor, author and columnist, Gulfport, Miss., as guest speaker. Following Mr. Rand's speech, C. A. Gustafson, chairman, N.C.S.A. Accident Prevention Committee, and superintendent of Callanan Road Improvement Co., South Bethlehem, N.Y., plant, will make the presentation of the N.C.S.A. safety awards.

Opening the afternoon session will be a speech by Arthur C. Butler, secretary, National PAR Committee, Washington, D.C., who will speak on "Project—Adequate Roads." B. D. Tallamy, superintendent, New York Department of Public Works, will discuss "The Trend Toward Throughway Construction."

Concluding the convention will be a reception and banquet, with Caskie Stinnett, humorist-raconteur, as banquet speaker.

Sand and Gravel and Ready Mix Convention Program

THE 37TH ANNUAL CONVENTION of the National Sand and Gravel Association and the 23rd annual convention of the National Ready Mixed Concrete Association will be held at the Fairmont Hotel, San Francisco, Calif., February 23-26, 1953.

The convention program is scheduled as follows:

Monday, February 23

The two boards of directors will meet in the morning following a joint breakfast at 8:30 a.m. The convention will be opened formally at 2:00 p.m., with addresses by Albert P. Shiely, president of N.S.G.A., and by Richard K. Humphries, president of N.R.M.C.A., followed by Frank B. Durkee, director of public works, state of California, who will speak on the public works program of California. The concluding speaker for the afternoon will be Vincent P. Ahearn, executive secretary of the two associations, who will give an appraisal of the new government and legislative prospects.

Tuesday, February 24

A joint session will be held in the morning, at which time Stanton Walker, director of engineering, N.S.G.A., will present his annual report, followed by a talk by J. R. Gilbert, U.S. Army Corps of Engineers, on "Aggregate and Concrete Specifications."

Following the joint meeting, a joint luncheon will be held. Louis B. Lundborg, vice-president of The Bank of America, San Francisco, Calif., will be the guest speaker.

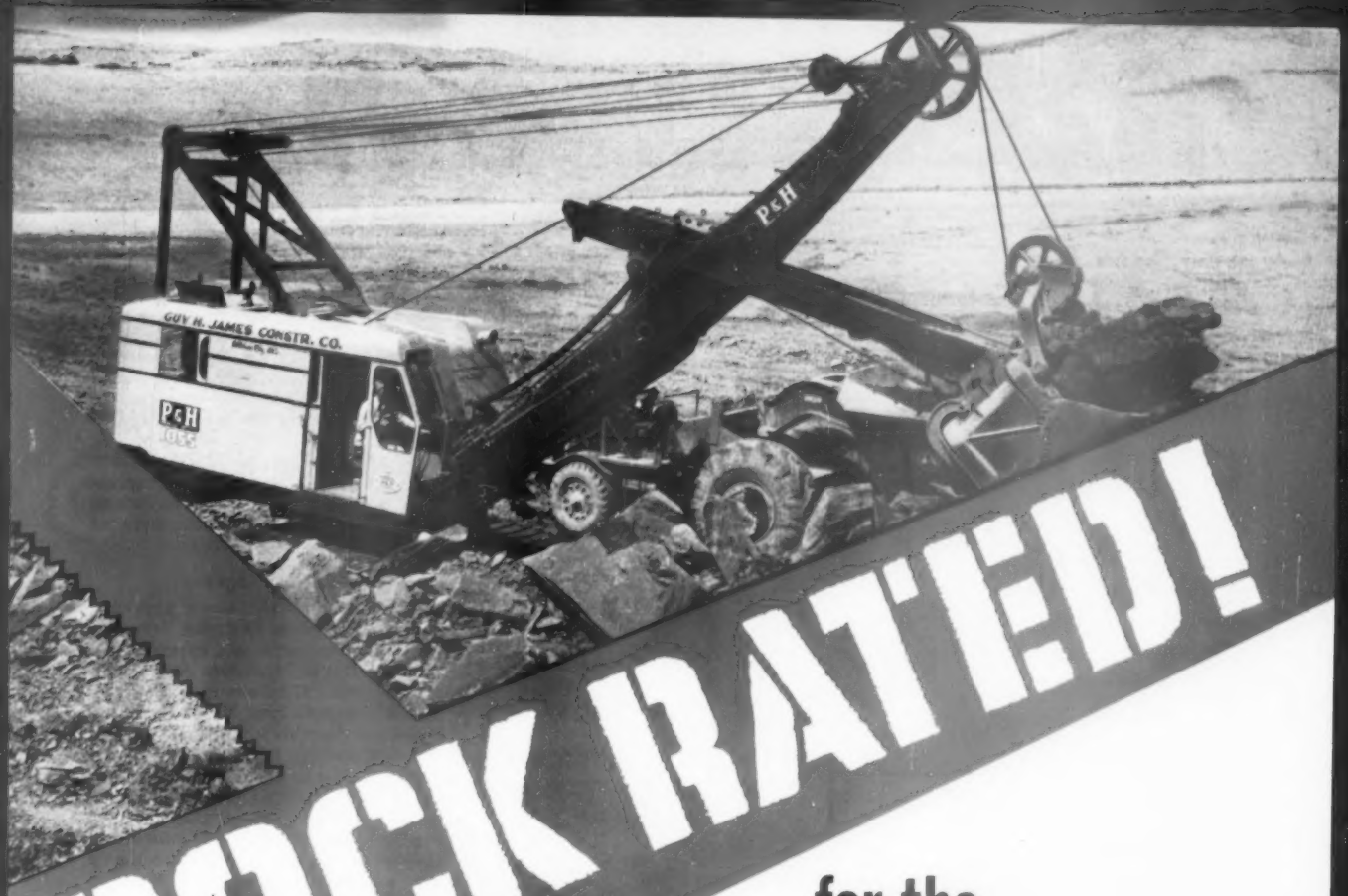
The afternoon session of N.S.G.A. will include a discussion of heavy media plants and tests; and an informal discussion of production and specification problems peculiar to California, in which a representative of the department of public works will participate.

There will be a second joint meeting in the afternoon, at which time problems of labor relations will be discussed by representatives of the two industries. This will be followed by a joint session on percentage depletion, with the discussions led by J. Rutledge Hill, chairman, N.S.G.A. committee on percentage depletion, and John T. Sapienza, tax counsel for the associations. Also included at this session will be a roundtable discussion of depreciation practices in the sand and gravel and ready-mixed concrete industries.

Wednesday, February 25

Convention activities for this day will be devoted to an all-day field trip, visiting the Eliot plant of Pacific Coast Aggregates and the Radum plant of the Kaiser Co. Bus service and lunch will be provided. Ready-mixed concrete plants will also be visited.

(Continued on page 170)



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But to get fully acquainted with this outstanding producer, let us direct you to a 955-A in action. If you want bigger capacity, same advanced design, ask about the P&H 1055-A (3½ yd.)

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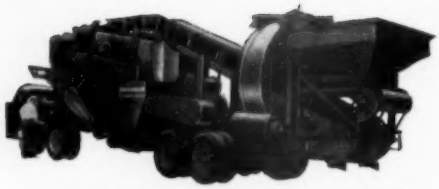
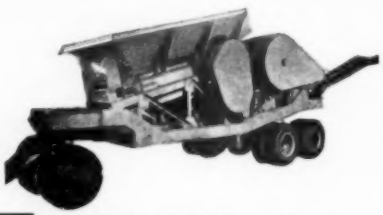


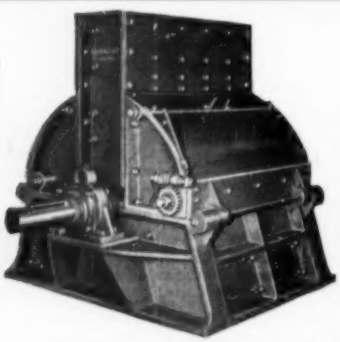
PORTABLE CRUSHING PLANT FOR AG-STONE AND ROAD ROCK

PORTABLE GRAVEL PLANT



PORTABLE PRIMARY CRUSHING PLANT

Large Primary Jaw Crushers in final assembly (below)



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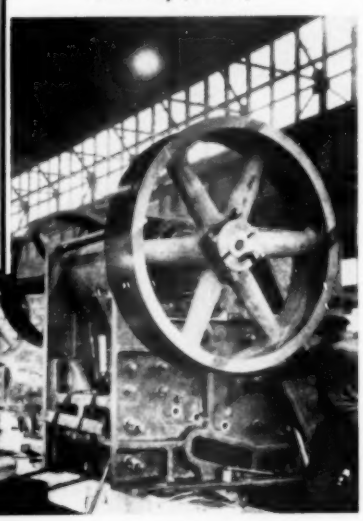

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Convention Program

(Continued from page 168)

Thursday, February 26

A joint session will be held in the morning. Vincent P. Ahearn will present his annual report, followed by a roundtable discussion of merchandising practices in the two industries.

The two associations will hold separate concluding sessions in the afternoon, at which time officers will be elected and safety trophies presented. At the N.R.M.C.A. session, Stanton Walker will discuss the truck mixer tests which he recently conducted at the University of Maryland.

Other topics to be discussed will include the group insurance program of N.R.M.C.A.; the use of industrial radio facilities; and a discussion of price, wage and other controls.

Ladies' Program

In addition to the above program, a special program has been prepared for the ladies, arranged by the Rock, Sand & Gravel Producers Association of Northern California and the Ready Mixed Concrete and Materials Association of Northern California. These two associations will be hosts to the ladies on Monday and Thursday. The ladies will be free on Tuesday and Wednesday to make independent plans, with a number of interesting choices provided. Activities include: a special luncheon in the historic Garden Court of the Palace Hotel; a tour of the highlights of the city, including Mission Dolores, the Golden Gate Park, the Cliff House, Chinatown and Fisherman's Wharf; other tours of the Bay Area, Stanford University, the University of California, Muir Woods, and a special shopping tour, are also planned.

Ownership Change

DWIGHT E. MANLEY, Rockton, Ill., recently acquired the entire interests of Lyle T. Manley, in the Portage-Manley Sand Co. and its affiliate, Manley Sand Co., both of Rockton.

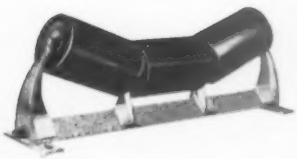
Portage-Manley Sand Co. is one of the largest producers of industrial sands in the Midwest, with plants located in Illinois, Wisconsin, Indiana, Missouri and Michigan. Newly elected officers of the company are: Dwight E. Manley, president; Karl O. Geng, vice-president; William Chadwick, secretary; and Tom M. Manley, treasurer. The new directors are Dwight E. Manley, Karl O. Geng and L. C. Miller.

The affiliate company is continuing operation as the selling medium of the corporation's products, with Dwight E. Manley, May B. Manley, Harriet Manley Erickson, Karl O. Geng and William Chadwick as co-partners.

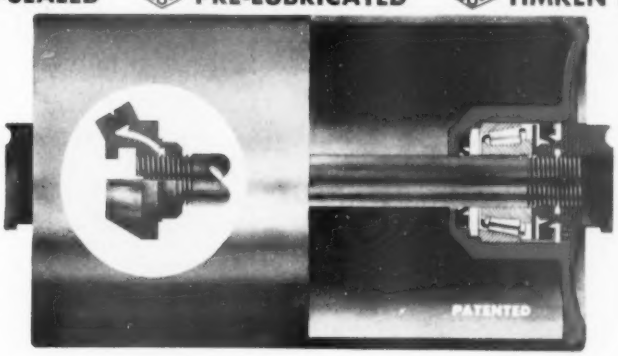
Limestone Quarry

CARL PARTIN has opened a limestone quarry near Hartford, Mo. The stone will be processed for road construction and agricultural limestone.

You Need... CONTINENTAL'S NEW UST Idlers



CGC UNIT-SEALED CGC PRE-LUBRICATED CGC TIMKEN BEARINGS



Saves Grease!
Saves Labor!
Saves Belts!
Long Life- THE ULTIMATE IN MINIMUM MAINTENANCE

Continental's Unit-Sealed "UST" Conveyor Idlers, incorporating Timken Bearings, Garlock Klozures, are the answer to the operator's prayer.

The Unit Bearing Assemblies—"sealed unto themselves" provide an ample but not excessive grease reservoir. This represents a saving of grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls. The lubricant is a top quality water repellant grease of a stable consistency with a wide temperature range for long life.

Most important—this construction permits operating the Continental "UST" Idler for extended periods of time without relubrication for 1-2-3 years or longer depending upon the severity or character of conditions.

For detailed information on these idlers write for Bulletin RP-116

CG—5210

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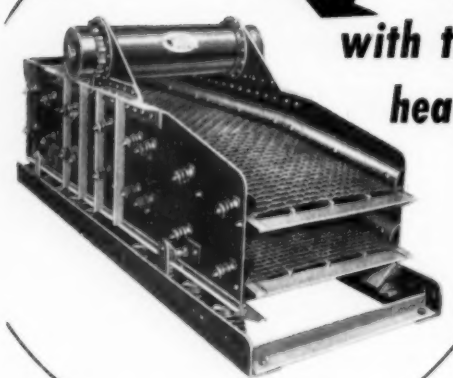
ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS • NEW YORK CGC MANUFACTURERS

MORE PRODUCTION . . . BETTER SAND

with the NEW DEISTER heavy-duty type UHS



Herbert Sand Company of Milltown, New Jersey, installed one of the first new triple deck 4' x 12' Deister, type UHS, Heavy-Duty Scalping Screens. The screen is producing up to 120 tons of sand and gravel per hour in five sizes in a wet operation—using 2,000 gallons of water per minute. With the new Deister UHS, production has increased substantially and sand quality is better than ever before . . . with a greater percentage of grits for a stronger sand demanded in this highly competitive area.

Mr. Herbert says "The vibrating mechanism is mounted high enough to stay dry during a rugged, wet operation such as ours . . . away from wear and abrasion."

An analysis of your own operation may prove the new Deister UHS will step up your production . . . and quality . . . and *profits*. Write for Bulletin 54 . . . and a data sheet . . . today.

Here's why users like it!

1. Life-time unitized vibrating mechanism . . . a precision-built, jig-assembled unit. Two bearing construction. Runs in bath of oil. Renewable sleeves and bearings.

2. Opposed elliptical throw . . . Deister's *exclusive* powerful throw action controls the movement of material on the screen for greatest speed and efficiency in sizing.

3. Divided screening sections . . . identical in size, may be readily interchanged or shifted to distribute normal wear and prolong life of screening medium. Different size openings may be used with each section, allowing up to 3 sizes on each deck.

4. Sizes . . . 3', 4' and 5' widths; 10', 12' and 14' long and in single, double and triple deck models.

DEISTER SCREENS

DEISTER MACHINE COMPANY

FORT WAYNE 4, INDIANA

New Portland Cement Process

J. C. WITT, consulting engineer, Chicago, Ill., has been issued U.S. Patent No. 2 611 714, for the development of a new process for the manufacture of portland cement.

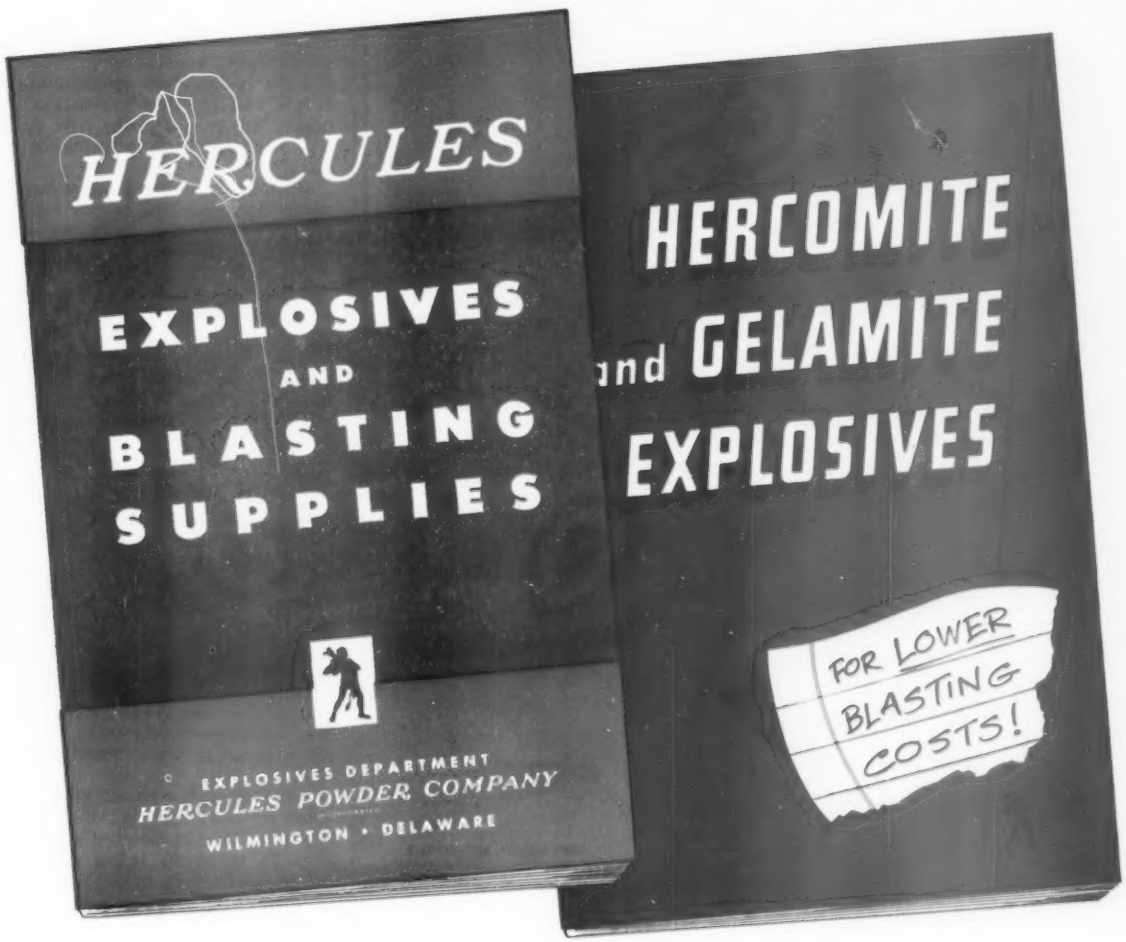
Research was started several years ago to find a process which would combine the advantages of the wet and dry processes. Study was based on such items as raw materials, fuels, plant equipment units and conventional manufacturing processes. The utilization of water was at first taken for granted, but later it was decided to make a critical study of water and it was found that while the advantages of the wet process are due to the presence of a mobile liquid which facilitates the grinding, blending, etc., the disadvantages could be traced to one or more of the physical and chemical properties of the water. A search was then made for some liquid other than water which would have the following characteristics: (1) Would remain liquid over a long range of temperature; (2) have no chemical reactions with water or with the compounds present in cement raw materials, even at rather high temperatures; (3) no deliquescence; (4) boiling point approximately 300 to 600 deg. F.; (5) low latent heat of vaporization; and (6) reasonable cost and availability.

After considerable research, a petroleum distillate was found to meet the requirements. Tests indicated that the liquid could be recovered almost completely by distillation (with or without preliminary treatment of the suspension) and the same supply could be used repeatedly with no build-up of undesirable elements, in contrast with the water suspension of the wet process. Also, any of the distillate remaining in the raw mix would burn in the kiln, thus contributing to the heat input. Further work on the process is now under way in the Sinclair laboratories. The results so far obtained are said to indicate many superiorities of the new process over the existing dry process and wet process.

There remains to be accomplished pilot plant runs and the design of any special equipment units that may be found desirable. However, it has been indicated that the plant layout will consist very largely of units now on the market.

For the present, the following procedure has been suggested: Add the non-aqueous liquid to the proportioned raw materials as they enter the compartment mills or the tube mills, just as water is added now, keeping the quantity at the minimum required for satisfactory slurry. Pump the slurry to two or more silos, and then to another silo, adjusting the composition as desired. Decant most of the liquid, distill off the remainder and pump all the liquid to the supply tanks. Convey the dry mix to the kilns,

Explosives Up-To-Date



New Booklets Just Off The Press

Here's the latest information on Hercules' complete line of explosives and blasting supplies . . . a total of 80 pages of valuable data on these products for mining, quarrying, construction, and seismic exploration. If you use explosives in any way, these two new booklets are a "must" for your engineering and purchasing departments. Write for free copies to:

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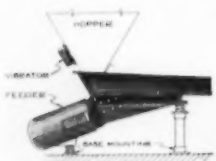
946 King Street, Wilmington 99, Delaware

Model F-45 Syntron Vibratory Feeder handling 250 tons per hour of pit run gravel as a primary charging system to a rock plant.

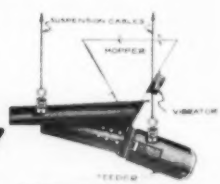
Adaptable To Your Needs

Handle Most All Types Of Bulk Materials



ROCK, SAND, LIMESTONE, ETC.—
HOT OR COLD—
DRY OR DAMP

SYNTRON
"VIBRA-FLOW"



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VIBRATORY FEEDERS

The adaptability of Syntron Feeders to your present processing system with minimum change, makes them more than ever the answer to your problems.

Featuring instant control of rate of flow, from pounds to hundreds of tons per hour, Syntron Feeders assure more efficient handling of materials in your processing system. Flexibility in handling most bulk materials allows various applications of Syntron Feeders to your material handling system.

There is a type and model Syntron Feeder for each of your problems or needs. The variety of sizes and styles ranges from Light Tonnage Feeders with capacities from one to ten tons per hour to Heavy Tonnage Feeders with capacities up to hundreds of tons per hour, with flat pan, tubular, grizzly, screening and many other types of troughs.

Catalog data is available upon request.

Send us the details of your problem — description of material to be fed, maximum feed per hour, desired length of trough, etc. — our Engineering Department will be glad to submit their recommendations.

TUBULAR

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FLAT PAN

SYNTRON COMPANY
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operated as dry process kilns. Collected dust may be added to the slurry. Continuous stirring is not required.

With the new process, it is claimed that dry plants can now have the uniformity of product previously restricted to wet plants, while wet plants can retain all their present advantages, and at the same time greatly reduce fuel consumption per barrel and increase production. New plants designed for the new process will have all these advantages combined.

Although the new process has been described in relation to raw materials only, it is said to be applicable to clinker as well. Now, for the first time, it is claimed that the cement manufacturer can produce cement with the uniformity of a wet process, blend two or more types of finished cement to produce another type, and so on, within wide limits. While it is recommended that the process be applied to both raw mix and cement, it can be applied to either one separately.

Conveyors Cut Cost

(Continued from page 132)

bottom-dump truck-trailers, mostly cab-controlled, to telescopic type truck-trailer combinations. At the Eliot and Centerville operations still another type haulage unit is now in service. This is the Cobra Wagon, a product of the Wooldridge Manufacturing Co., Sunnyvale, Calif., which was described briefly in the January, 1952, issue of ROCK PRODUCTS, page 129.

Loading in the pit at Eliot is handled by a 5-cu. yd. Bucyrus-Erie electric, Class 24 dragline which often digs 10 to 15 ft. below water. The pit is 140 ft. deep at the lowest point. The 5-cu. yd. dragline casts the material back and upward where one of two 3-cu. yd. 54-B Bucyrus-Erie draglines load to the Cobra Wagons. Esco buckets are used on all three draglines. By loading loose material in this manner, one of the 3-cu. yd. draglines loaded 800 t.p.h. in a recent run.

This method of loading is followed to prevent excavation of clay lenses that are bedded horizontally in the deposit. If the lens is of appreciable thickness, digging can be done to its top surface and, when fully exposed, can be easily removed and not sent to the processing plant.

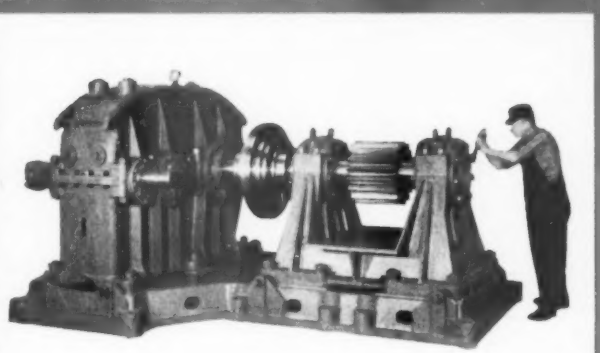
Water supplied by three deep well pumps is augmented by some water from the pit. Tailings from the washing operations are collected in worked-out portions of the pit.

The plant is served by the Southern Pacific and the Western Pacific railroads with about 50 percent of the plant output going out by truck.

J. D. Kaufman is operations manager of plants for the company; Leo Bunds is district production superintendent and Wm. Bottini is plant superintendent at Eliot. George Hampton is chief engineer.

When It Comes to
POWER TRANSMISSION
On the BIG JOBS

Look to... **Jones**



Cement Kiln Drive

SPEED REDUCERS AND COMPLETE DRIVES TO 500 HORSEPOWER

HERRINGBONE WORM GEAR WORM HELICAL

JONES Products—*While specifically* designed for the heavy industries — *are competitive for all applications.* All the added values of sturdier design, heavier construction and better materials are yours without extra cost.

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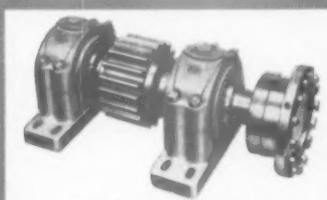
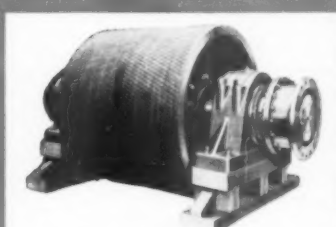


Shaft Assembly Mounted on 4-15/16" Pillow Blocks

PILLOW BLOCKS to 9" Shaft Size

Timken Equipped, Adaptor Sleeve Type
Self-Aligning, Dust-Tight
Sizes to 4-15/16" in Stock



Jones 60" x 57" Rubber Covered Pulley mounted on 9" Jones Timken Pillow Blocks

CAST IRON CONVEYOR PULLEYS

Tailor-Made to Your Requirements.

CUT GEARS

to Your Specifications

HERRINGBONE - WORM
HELICAL - BEVEL - SPUR

Spur Gear and Pinion Stand

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In The Service Of Industry

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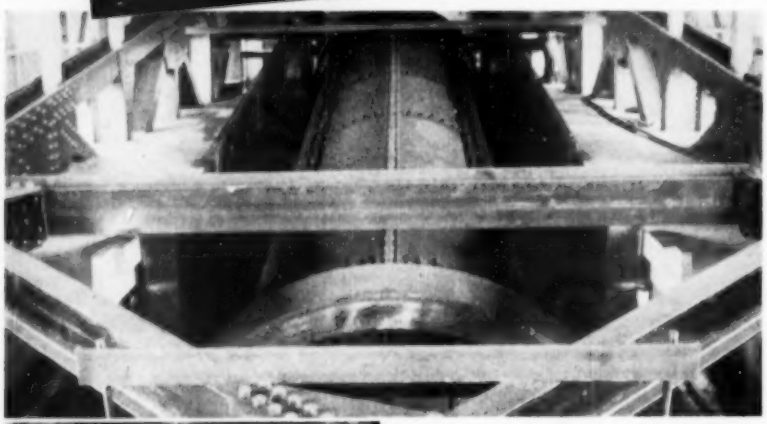
ANTI-FRICTION PILLOW BLOCKS • FLEXIBLE COUPLINGS

For long wear and high production

use YUBA SCREENS and CONVEYORS



YUBA makes Abrasion Resisting Steel Screens, flat or revolving, for all screening purposes—separating, scrubbing, sizing. Holes are taper drilled to prevent clogging, can be small and closely spaced for screening sands bearing monazite and other rare earths. All thicknesses from ¼" up; other dimensions as big as your needs—screen shown is 50' long, 9' diameter, weighs about 65 tons. Competitive prices—ask for quotations.

YUBA-built conveyor pictured can handle 1440 tons per hour, is part of nearly mile-long conveyor system carrying crushed rock (minus 8") from pit to plant to stockpile. Yuba has built hundreds of heavy-duty conveyors for rock, gravel and sand since 1909. Put this experience to work on your conveying problems NOW.

SCREENS,
CONVEYORS,
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built-to-order machinery—Yuba will gladly furnish estimates. Wire, write or call—no obligation, of course.

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CABLES: YUBAMAN, SAN FRANCISCO · SHAWDARBCO, LONDON

Labor Relations Trends

(Continued from page 79)

usually reserved to management, the employer would usually have the right, regardless of past practice, to determine how many employes shall be assigned to a repair job unless in a particular instance, it had agreed to limit that right.

"The evidence established that, until the new agreement of May, 1952, it had been the invariable practice of the employer for many years to call the full crew, including the two pitmen, to make the repairs of the shovel in the plant. The employer conceded that for many years the full crew of engineer, fireman, and two pitmen were called in to repair the shovel, but sought to establish that it was not done 100 percent of the time but only '60, 70, or 80 percent' of the time.

"The union representative also testified that 11 years ago an agreement had been made between the Engineer's union delegate, the Hod Carriers' delegate, and the plant superintendent that if and when the engineer and fireman came out to work on the shovel the two pitmen would also be called to work. The existence of this agreement was not denied or challenged by the employer although one witness called by the employer denied any knowledge or information of such an agreement.

"The evidence established that the agreement to call the full crew on shovel repair jobs did exist. There was unchallenged testimony to the effect that on at least one occasion a few years ago the pitmen were not called to work on a shovel repair job. Because of this oversight, the men were nevertheless paid for the day. Such agreements exist in a number of other industries, i.e., the music industry where a minimum number of musicians are required for certain performances; and the shipping industry where a minimum number of men in a 'gang' must be employed for loading or discharging cargo.

"The question remains, however,—does the agreement made years ago still apply especially in the light of Article XXII of the written agreement entered into by the parties which reads that:

'All agreements heretofore made between the parties hereto are hereby cancelled and it is agreed that this instrument shall constitute the only agreement between the parties.'

"Relying on Article XXII, the employer contended that all prior agreements, written or oral, were abrogated and that consequently it had the right to determine the number of employes to be assigned to a regular job.

"The union insisted that the employer did not have the right to change oral agreements previously made on this subject because the parties had never discussed or contemplated such a change. It contended

(Continued on page 178)

WHO PIONEERED FULL-FLOW FILTRATION?

WINSLOW,
OF COURSE

WHO SAID IT WOULDN'T WORK?

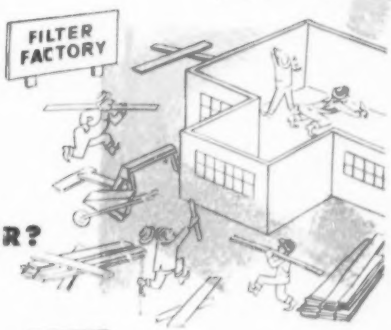
SEVERAL
COMPETITORS

WHO IS NOW FALLING INTO LINE?

THOSE SAME
COMPETITORS

WHO IS STILL THE NATURAL LEADER?

WINSLOW, OF COURSE



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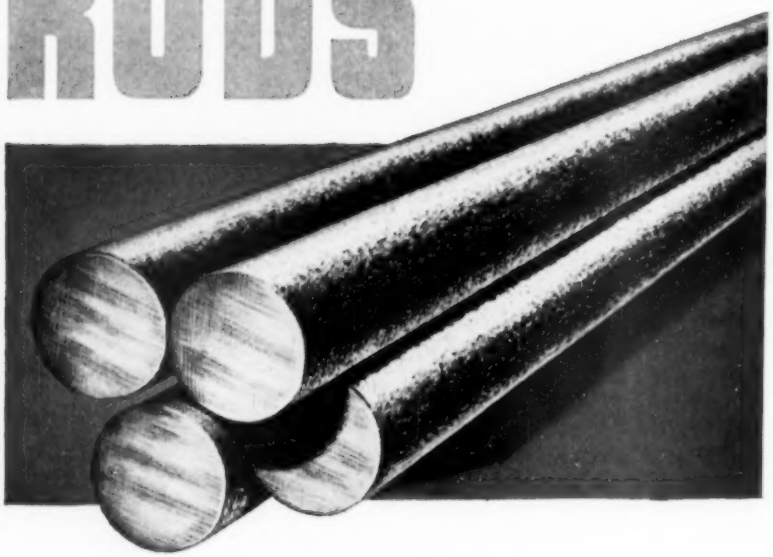

● CF&I Grinding Rods are hot rolled from special analysis steel—machine straightened with *square cut ends*. They resist abrasion, wear evenly and provide efficient, economical grinding.

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Cal-Wic Wire Cloth Screens ● Wickwire Rope
Grinding Balls ● Grinding Rods ● Light Rails and Accessories

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CF&I
GRINDING RODS
THE COLORADO FUEL AND IRON CORPORATION

1947

Labor Relations Trends

(Continued from page 176)

that Article XXII merely cancelled all written agreements and written riders made between the parties and did not change the oral agreement pertaining to the point in issue.

"The evidence established that when Article XXII was being discussed during the negotiations the union representatives inquired what effect the clause would have. In those discussions it is clear that the employer did not mention that it included oral agreements. Moreover it is also clear that there was never any discussion during the negotiations that the 11-year practice based on the oral agreement could be, or would be, abrogated by the inclusion of such a clause. The record shows that there was no meeting of the minds of both parties on this point.

"Contracts can be changed by practice or custom where over a sufficient period of time the practice and custom amounts to a mutual acceptance. In situations such as those, oral agreements may be just as good as written agreements and supplement the written agreements.

"In construing the agreement the arbitrator must look to the whole of the instrument. He must interpret it not only in the light of the language contained therein but also in the light of what it appears the parties themselves agreed upon and meant.

"On the basis of all the evidence I find that although management generally has the right to determine how many employes shall be assigned to a repair job it has limited that right, in the case of the crew needed to repair the electric shovel, by the agreement it made with the union which has remained in force for many years. This, of course, does not prevent the employer from seeking a modification of that agreement when the terms of a new collective bargaining agreement are being negotiated.

"In view of the confusion with respect to the rights of the parties, I find that no back wages should be paid the pitmen for the days they were not called into work on the electric shovel repair. But I find that management as of now does not have the right to use less than the full crew whenever the electric shovel requires repair."

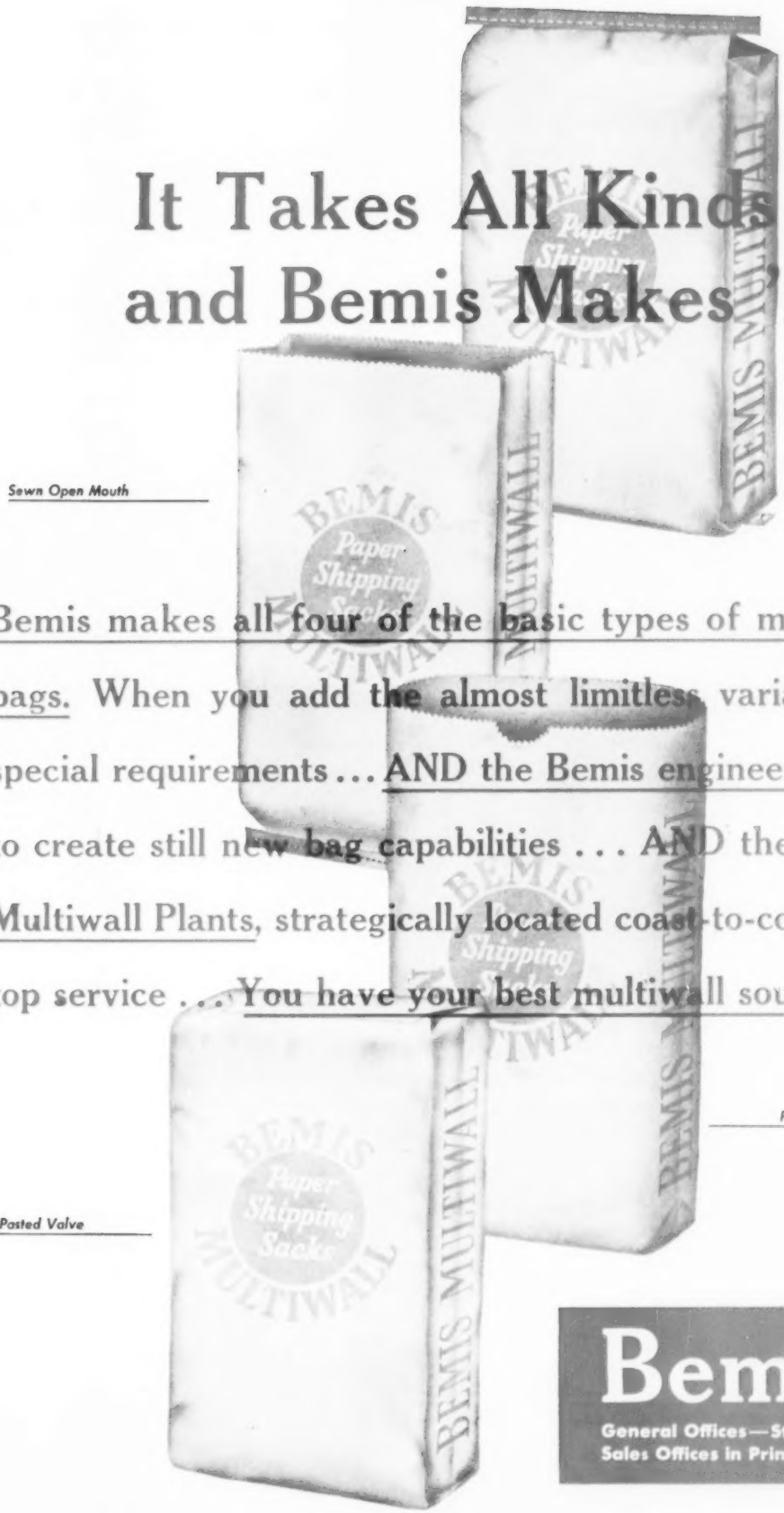
Buys Gravel Plant

GLOBE BUILDERS SUPPLY, Concord, Calif., has purchased the Baker Trucking Co. gravel plant at Richfield, Calif., and will continue to operate the plant.

Israel Cement Production

WITH THE completion of a second cement plant now under construction, Israel will have capacity to produce 250,000 tons of cement per year in excess of actual requirements. Last year the output was 460,000 tons.

It Takes All Kinds...
and Bemis Makes 'Em



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Sewn Open Mouth

Bemis makes all four of the basic types of multiwall paper bags. When you add the almost limitless variations to meet special requirements... AND the Bemis engineering know-how to create still new bag capabilities ... AND the twelve Bemis Multiwall Plants, strategically located coast-to-coast to give you top service ... You have your best multiwall source ...

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ANOTHER
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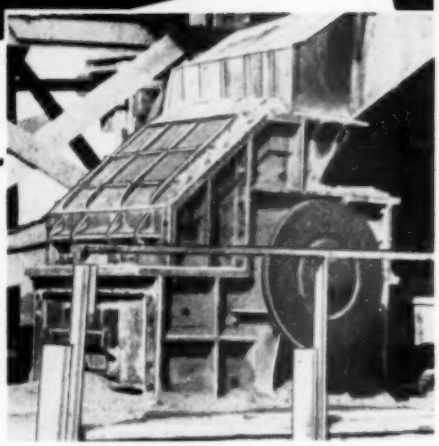
PERFORMANCE REPORT

50,000 TONS OF -5" ROCK TO AGLIME

... WITHOUT A SINGLE REPAIR

FIELD REPORT
No. 21
Illinois Quarry



TYPE OF CRUSHER:
American ASC No. 4 Up Running Hammermill.

OPERATION:
Reducing minus 5" rock to agricultural limestone.

PRESENT CAPACITY: 60-120 tons per hour, depending on moisture content of stone.

PROBLEM: Very wet rock, showing 8% moisture—sticky at all times.

COMMENTS FROM USER: "Hammer wear is remarkable: 9400-9700 tons of lime ground to 100%, passing No. 8 mesh, per set of hammers . . . Remarkably efficient mill . . . meets our requirements in every way."

Write: for Bulletin No. 147 — "Better Stone Crushing"

American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers

1245 Macklind Ave. St. Louis 10, Mo.

Outstanding Stone Plant

(Continued from page 125)

Richards Spur plant. Executive vice-president Vernon Gossi came to the companies as a westerner and is new to the quarry industry. Troy Shelton, formerly a partner in the large and very highly respected Oklahoma City law firm of Embry, Johnson, Crowe, Tolbert and Shelton, is vice-president in charge of financial and legal matters. Walter S. Knox, who has had over 35 years experience in the operation of stone quarries and crushing plants is general superintendent of Dolese Bros. Co., which has as one of its operations the Richards Spur plant. J. G. Goodner, who has been with Dolese Bros. Co., 21 years is sales manager for the company and J. A. Yingling is superintendent at Richards Spur. D. H. Lacy is general superintendent of all ready-mixed concrete operations and has been with the companies for 33 years.

W. T. Johnson is safety engineer for both companies. He travels the various plants, makes spot inspections and conducts regular safety meetings. These are held at the plants and the entire working force is present. Plants are heavily posted with safety signs and warnings. At the time of our visit, Richards Spur had a record of well over 400 days without a lost-time accident.

Main sales offices of the company are at 13 N.W. 13th Street and the temporary location of the executive, accounting and auditing offices is at 20 N.W. 12th Street in Oklahoma City. A new office building program is well underway which will centralize the executive, accounting, auditing, and engineering departments in a building directly across the street from the main sales offices. These two office buildings are connected by a private personnel tunnel recently constructed under N.W. 13th Street.

Canadian Dolomite Plant

STEETLEY OF CANADA LTD., a subsidiary of The Steetley Company Ltd., England, has been formed to produce dolomite refractories. It plans a $3,500,000 project in Canada, $2,000,000 to be used for building a plant at Dundas, Canada. The British Treasury has authorized the company to invest $1,000,000 with $2,500,000 to be raised in Canada through a bond issue.

The company plans to acquire an interest in a dolomite deposit at Dundas. The plant is expected to be in operation early in 1954.

Leases Quarry

H. V. WINDSOR has leased the Bramhall quarry near King City, Mo. He has been manager of the operation since it was opened several years ago. Limestone will be quarried and processed for road construction and agricultural limestone.

LOADING — High reverse speeds, power steering and high lift make the Model HM flexible and fast for loading operations with output between 100 and 150 cu. yds. per hour.

STRIPPING — The ability of the Model HM to dig and load enables it to strip overburden and load it too when advisable. Precise bucket control also insures a close, clean stripping job.

FEEDING — In many pits it is more economical and practical to feed conveyors with "PAYLOADERS." The ability of the "PAYLOADER" to feed material selectively is often a valuable asset.

PULLING & PUSHING — The 90 horsepower engine and 4-wheel drive provides lots of drawbar horsepower for pushing, pulling and equipment-shifting work.

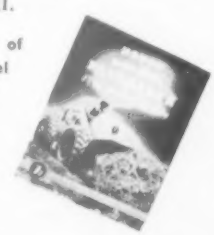
MASTER OF MANY JOBS

The big Model HM "PAYLOADER" tractor-shovel is popular at pits, quarries, mines and plants because it is both capable *and* versatile . . . is able to do many jobs and move quickly from place to place at speeds of 17 m.p.h. Big tires, plus 4-wheel drive, gives it catlike traction over rock, dirt and sand. Power-boosted rear wheel steering makes it maneuverable and easy to handle . . . 4 gear ratios in each direction provide the right speeds to fit each task.

The powerful 1½ cu. yd. "PAYLOADER" is the flagship of the "PAYLOADER" fleet, which includes 7 sizes down to 12 cu. ft. bucket capacity.

Also a choice of 4 wheel drive, rear wheel drive and front wheel drive to best fit your needs. Your Hough Distributor, one of 200 in the U.S. and Canada, is ready to serve you *right* — with extensive application experience and complete parts and service facilities. The Frank G. Hough Co., 705 Sunnyside Ave., Libertyville, Ill.

WRITE for full information on any of the "PAYLOADER" models: FourWheel Drive HM — 1½ yd. and HR — 1 yd.; Rear Wheel Drive Models HY — 1¼ yd., HF — ¾ yd., HE — ½ yd.; Front wheel drive Models HAH — 15 cu. ft., HA — 12 cu. ft.



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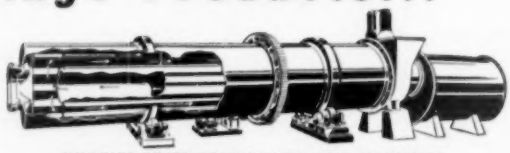
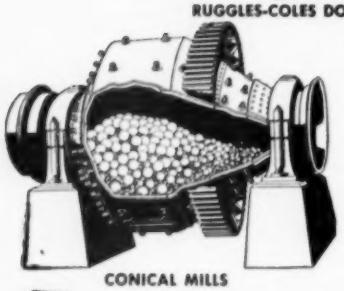
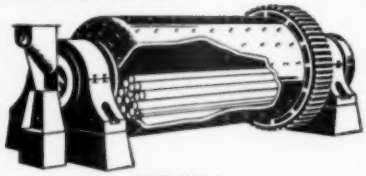


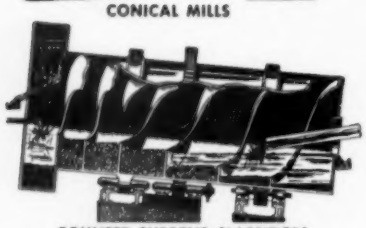
RUGGLES-COLES DOUBLE-SHELL ROTARY DRYERS



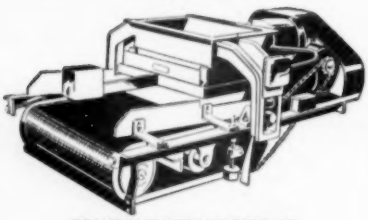
CONICAL MILLS



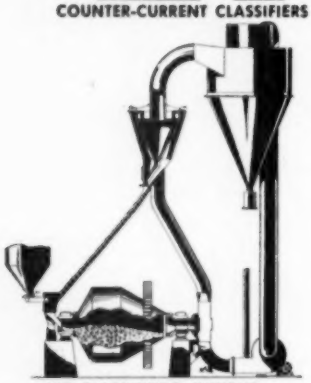
ROD MILLS



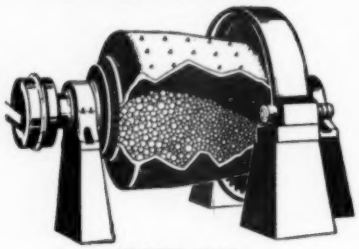
COUNTER-CURRENT CLASSIFIERS



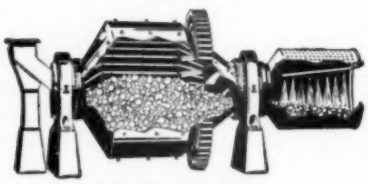
CONSTANT-WEIGHT FEEDERS



AIR CLASSIFYING SYSTEMS

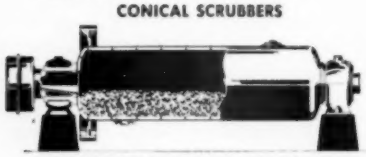


TRICONE MILLS

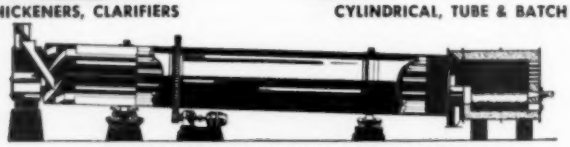


CONICAL SCRUBBERS

THICKENERS, CLARIFIERS



CYLINDRICAL, TUBE & BATCH MILLS



RUGGLES-COLES SINGLE-SHELL ROTARY DRYERS

HARDINGE
COMPANY, INCORPORATED

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Radam Plant

(Continued from page 129)

12-ft. standard discharge Marcy rod mills; one 5½- x 12-ft. peripheral discharge Marcy rod mill; three 4-ft. standard Symons cone crushers; ten sand classifiers and dewaterers (Dorr and Bodinson, and some company-made); Wilfley and Kimball-Krough pumps; three Industrial Brownhoists for reclaiming from stockpiles; Noble ready-mixed concrete and dry batching equipment and a company-made unit; three diesel switching locomotives, a 25-ton and two 30-ton Plymouths; and a 43-ton General Electric diesel-electric locomotive.

Before proceeding with a more detailed description of the plant, a brief word about the so-called slurry mill should be of interest. The slurry mill (a relatively new term to the sand and gravel industry) comprises a double-deck vibrating screen over two bins with a pug mill below. The unit is designed to prepare crusher-run base. The slurry base includes the addition of water to the pug mill. The bins hold minus ¾-in. and plus ¾-in. and minus 2-in. materials (crushed or uncrushed or both). Belt conveyors serving the vibrating screen include a belt to deliver crusher dust from stockpiles as well as from offbearing belts.

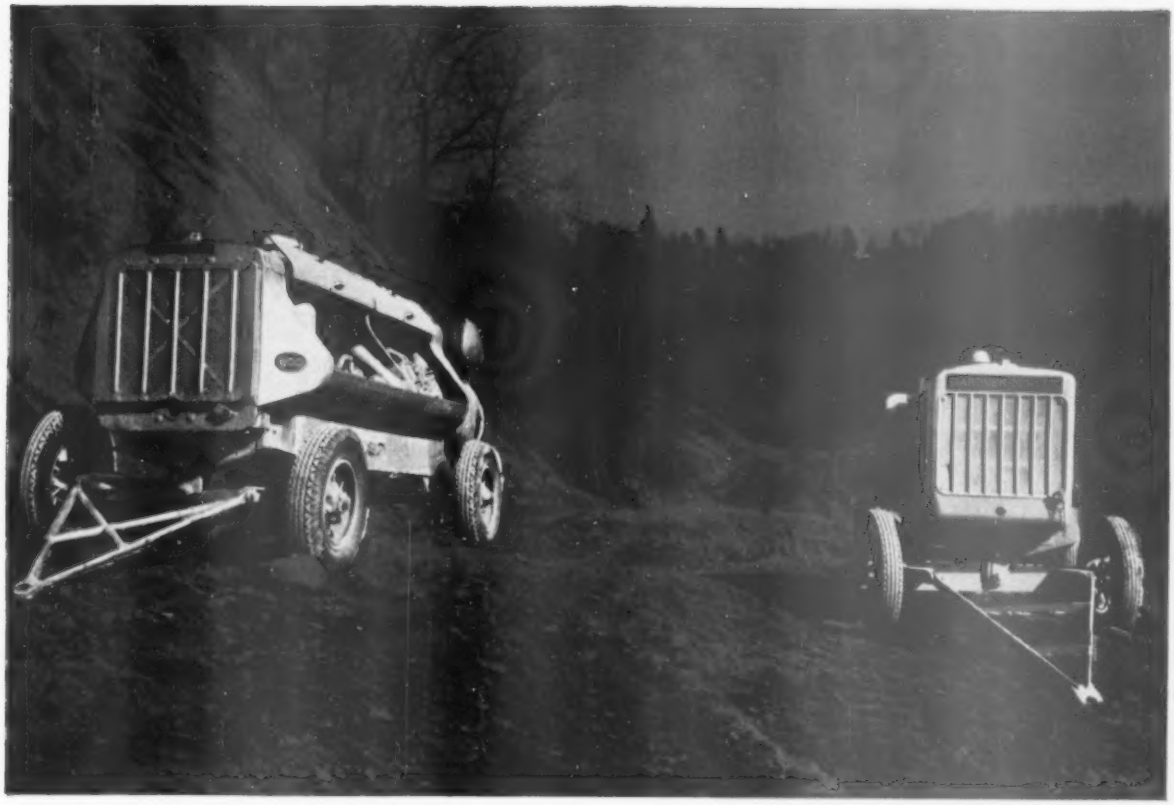
Stockpiling Methods

The method of stockpiling finished materials is rather unique. Most finished material is usually stockpiled at night; however, this work is also carried on in the daytime. One material is stockpiled at a time. The system is built around the use of a radial stacker assembly with a movable stacker boom, all built on a flat car. The flat car rides an industrial track that is about 1200 ft. long, and is built on a straight line. A 36-in. belt (Fig. 2) delivers the material to the tripper and to the stacker belt and a large number of different sizes of gravel and crushed gravel can be stockpiled in two rows, one on each side of the track. Sand is stockpiled from its own stacker system. Pea gravel is also stacked via its own system of belt conveyors. Reclaiming is done with three clamshells. Adequate rail switching facilities are available as well as about two miles of track for intraplant switching.

About 35 percent of the plant output is trucked in the summer time and about 25 percent in the winter months. The balance of the output goes out over the rails of the Southern Pacific and Western Pacific railroads, both of which serve the plant. Car shortages are chronic and account for lower production rates.

Crushed gravel is kept separate from the uncrushed and all are washed. Material loaded to cars or trucks is rinsed on a battery of six Robins single-deck screens located under the surge bins or loading bunkers.

In the flow sheet (page 127) of the



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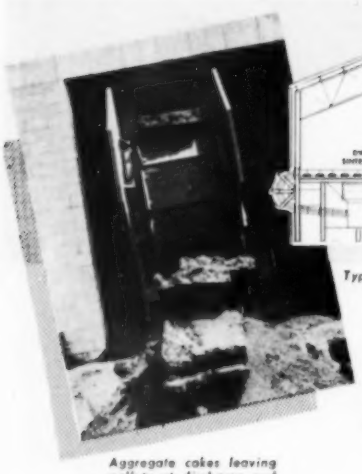
Make Your Own Lightweight Aggregate at LOW Cost!

Typical Dwight-Lloyd Lightweight Aggregate Sintering Plant.



Aggregate cakes leaving pallets at discharge end of sintering machine.

Make your own expanded aggregate—light, strong, stable and with superior wet-dry contraction characteristics—from clay, shale, fly ash and other suitable residues or waste materials, using the

DWIGHT-LLOYD SINTERING MACHINE

- **LOW PRODUCTION COSTS**—Automatic operation, no skilled labor required.
- **CONTINUOUS OR INTERMITTENT**—Operate 24 hours a day or intermittently without loss of efficiency, standby or restarting costs.
- **LONG LIFE—LOW MAINTENANCE**—Many plants in continuous operation for over 30 years with exceptionally low maintenance.
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Pilot Sintering Plant at your service for testing materials under actual operating conditions. Let us test your raw materials and offer our recommendations to meet your requirements.

LIGHTWEIGHT AGGREGATE DIVISION

SINTERING MACHINERY CORPORATION

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Pulverizers

Have you investigated our new BRADLEY HERCULES MILL? Unquestionably the last word in Economy and Simplicity.

(Send for New Catalog No. 59)

BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.

plant, the abbreviations stand for the following: "Co" for "coarse," "Sm" for "small," "R" for "Robins," "N" for "Niagara," and "S" for "Symons screens." The following sizes of material are normally produced: Co 5 gravel, plus ½ in., minus ¾ in.; Sm 5 gravel, plus ¼ in. minus ½ in.; Co 5 crushed, plus ½ in. minus ¾ in.; Sm 5 crushed, plus ¼ in. minus ½ in.; No. 6 crushed, plus ¼ in. minus ⅜ in.; No. 7 crushed, plus 0.128 in. minus ¼ in.; pea gravel, plus ¼ in. minus ⅜ in.; No. 2, plus 1½ in. minus 2½ in.; No. 3, plus 1¼ in. minus 1½ in.; No. 4, plus ¾ in. minus 1¼ in.; roofing gravel, plus ⅛ in. minus ¼ in.; concrete sand; asphalt sand, and manufactured sand.

Manufacture Sand from Pea Gravel

Similar to the other large operations in the Livermore Valley, pea gravel in the deposits is in excess of sales requirements. At the Radum plant a stockpile at one time had about 3,000,000 tons of pea gravel accumulated over the years. During the past five years rod mills have processed some of this stockpile as well as current production into a manufactured sand. The first installation was described in the October, 1947, issue of ROCK PRODUCTS, page 103, but since then a second rod mill was installed. However, up to the fall of 1952, the second rod mill operated dry and the ground sand was kept separate from that produced by the older wet grinding mill. Both mills are 8- x 12-ft., standard discharge Marcy rod mills, and each is powered by a 350-hp. synchronous motor. Equipment was available to blend the sand produced from the wet grinding circuit with that of the dry if specifications for asphalt or concrete sands required it. Recent changes in specification resulting from the new California highway department's so-called "Sand Equivalent Test" made it necessary to stop dry rod milling and in November, 1952, a new 60-in. Wemco sand classifier was added to the circuit. It operates in open circuit with a rod mill. This classifier, similar in design to the better known sand recovery machine, has an adjustable overflow weir and acts as both a classifier and de-slimer. The weirs make it possible to adjust the depth of the pool; shallow pools are used for coarse separations and vice versa.

The mills each carry a load of 70,000 lb. of 3-in. Sheffield high carbon rods. Rod wear is roughly one pound of rod per ton of sand. Corrugated manganese liners are used and liner wear has been 0.25 lb. per ton of sand produced.

Since the publication of the data of the first large rod mill, one significant change was made: previously the mill operated in open circuit with a 15-ft. Dorr duplex bowl classifier, but now a 4- x 8-ft. Robins screen receives the pulp from the mill and any plus

Proved Performance

on the toughest jobs

On a wide range of jobs and under the toughest conditions, "Eucs" move more loads or tons per hour at the lowest cost. Large capacity, long life in heavy duty service, and speed on the haul and dump—these are features that assure low cost hauling and dependable performance.

Bottom-Dump Euclids have proved their rugged staying power and ability to do the toughest jobs in off-the-highway construction and industrial work. Powered by diesel engines of 190 to 300 h.p., they range in capacity from 13 to 25 cu. yds., and have top speeds loaded up to 34.4 m.p.h.

Rear-Dump "Eucs" are designed and built to move rock, coal, ore, overburden and other heavy excavation. They range in capacity from 10 to 34 tons, have top speeds up to 36.3 m.p.h. with full payload, and diesel engines of 125 to 400 h.p.

For help with your off-the-highway hauling problems, call your Euclid Distributor today or write for information on the complete line of Euclid equipment for moving earth, rock, coal and ore.

"EUCS" are job proved for more loads per hour and more profit per load.

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EUCLIDS *Move the Earth*

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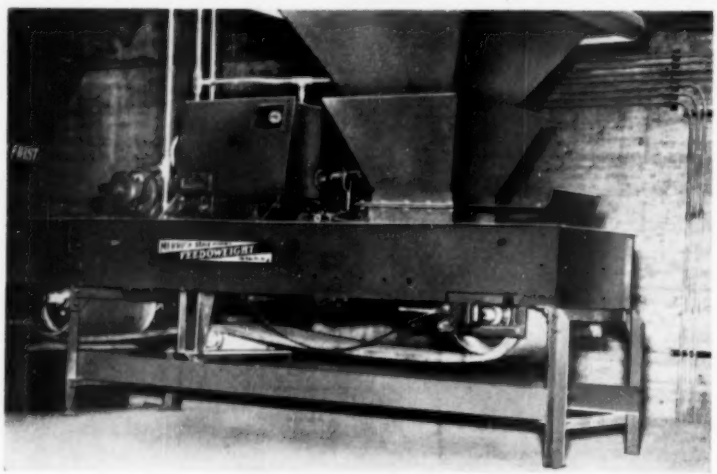

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FEEDOWEIGHT* accurately, continuously and automatically feeds and weighs uniformly by Weight. Extensively used in Cement Plants for feeding and proportioning raw mix components as well as Clinker and Gypsum to finishing mill.

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¼-in. material is returned by belt conveyor to the feed belt. The throughs from the Robins fall to the previously used 15-ft. Dorr bowl classifier. The rake product is transported by belt conveyor to car loading bunkers, or it can by-pass the bins and go to an elevated stacker belt system for drainage and storage.

The second large rod mill receives its feed from its own reclaiming tunnel under the pea gravel stockpile, similar to that used on the older mill. There is no screen at this mill's discharge with the pulp flowing direct to the 60-in. Wemco sand classifier. Finished sand from this unit is sent by belt conveyor direct to the overhead stacker system. After draining, the two products are either 'dozed with Caterpillar equipment over the reclaiming tunnel that is alongside and almost parallels the stacker belt. The two sands are kept separate but can be blended on the reclaiming belt if desired. The mills each produce 65 t.p.h. of sand. Caterpillar tractors with dozers aid in getting some of the pea gravel in the large stockpile over the tunnels in which the feed belts to the mills operate. The use of a cone crusher in the rod-mill set-up has been discontinued.

On the older wet rod mill, the discharge has about 22 percent minus 200-mesh material. Sand from the classifier has 6 to 7 percent minus 100 mesh with 2 to 3 percent 200 mesh. The overflow from both classifiers is wasted. These two rod mills operate as a department in itself having no relation to the main plant's sand recovery system, nor is this manufactured sand blended with natural sand. However, in the plant itself, and working on current production of pea gravel, is a third but smaller rod mill. It also is a 5- x 12-ft. Marcy but is a peripheral discharge mill which is producing 30 to 35 t.p.h. using a 150-hp. motor. It is interesting to note that the discharge from this mill is 15 to 16 percent minus 200 mesh, thereby producing less fines than the standard discharge mills. The standard discharge mills receive their feed at one end and discharge through the opposite trunnion. The peripheral discharge mill

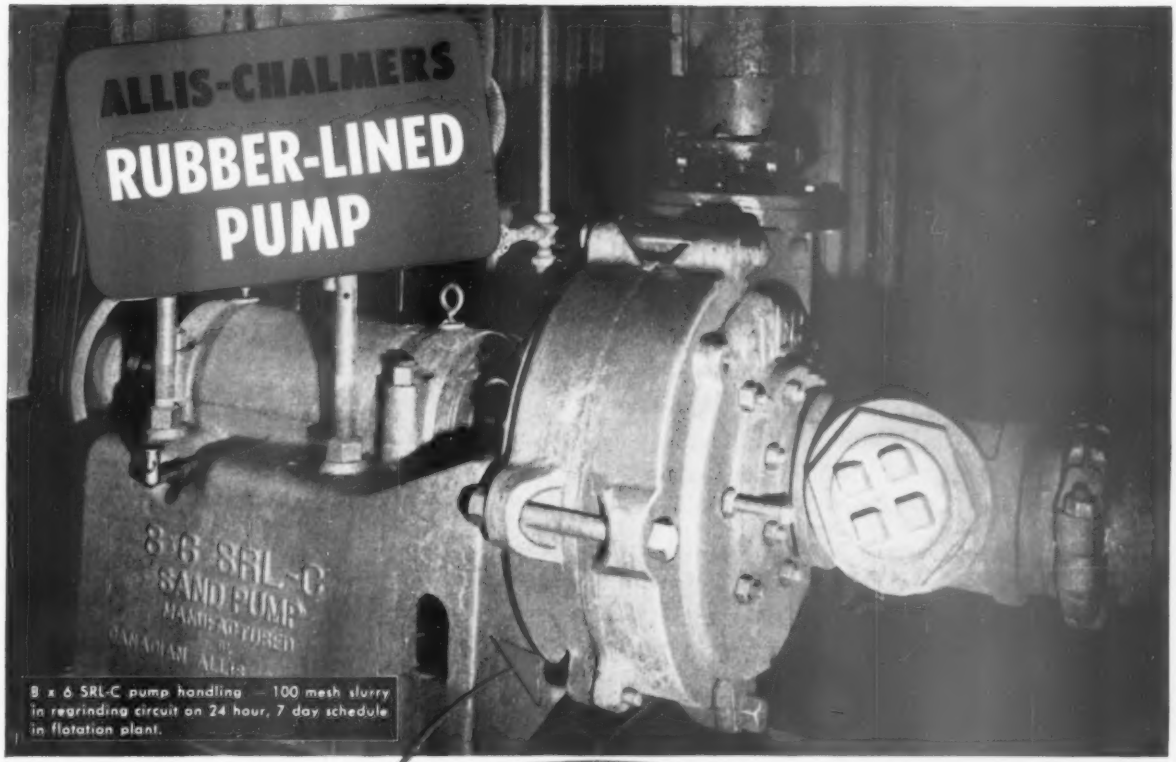
A NEW PROCESS FOR PORTLAND CEMENT MANUFACTURE

U. S. Patent 2,611, 714

There are now three processes for cement manufacture - - the dry, the wet, and a new non-aqueous liquid process. In the new process a petroleum distillate, not water, is the suspension liquid. This results in the uniformity of the wet process together with the decreased fuel consumption, increased waste-heat power generation, and other advantages of the dry process. Also, for the first time, clinker may be ground in the presence of a liquid, with many features desirable to both the cement manufacturer and the cement user. Development of the petroleum technology of the new process is a Sinclair Plan project.

For further information apply to the owner of the process,

J. C. WITT, Consulting Engineer
5834 Stony Island Avenue, Chicago 37, Illinois



8 x 6 SRL-C pump handling — 100 mesh slurry in regrinding circuit on 24 hour, 7 day schedule in flotation plant.

Here's How THIS PUMP Cuts Slurry and Slime Pumping Costs

SPECIAL RUBBER COMPOUNDS, engineered to fit each application, resist wear of even the most abrasive slurries and slimes. Original capacity and efficiency are maintained over long periods. Records show that the Allis-Chalmers rubber-lined pump has a service life 10 to 50 times greater than the finest alloy pumps when handling finely divided, highly abrasive materials. This means that the higher price of the rubber-lined pump is saved many times over in lower maintenance cost and less lost production due to shutdowns. The stuffing box, too, is specially designed to reduce packing wear.

EASY MAINTENANCE

Maintenance on the Allis-Chalmers rubber-lined pump is easy. All parts normally requiring attention are accessible for inspection, adjustment or replacement. The casing can be parted easily when impeller and liners must be checked. The stuffing box is easy to work on.

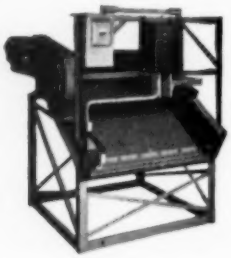
The casing liners are of unique construction. The rubber compound is pressure-molded to steel frames. The liners fit into casing easily and are held securely in place by studs which are part of the steel frame and are securely embedded in the rubber. Liners and the impeller can be renewed without removing the pump from its location and spares can be kept on hand.

COMPETENT APPLICATION ENGINEERING

Allis-Chalmers application engineers are thoroughly familiar with all types of solids pumping problems. Allis-Chalmers can furnish you a complete pumping unit — pump, motor, control and drive — all of coordinated design and manufacture. For help on your solids pumping problems, call your nearest Allis-Chalmers District Office. For more information on the A-C Rubber-Lined Pump, write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 08B7311.

A-3897

ALLIS-CHALMERS



Electric Screen Heating for BIGGER TONNAGES of Lime, Ag-Lime, Silica Sand

The Leahy No-Blind Vibrating Screen equipped with FlexElex produces substantially bigger tonnages in damp, fine mesh screening.

FlexElex electric heating keeps the wires warm and dry, preventing build-up and eventual glazing of the mesh by damp fines.

To this, add Leahy Differential Vibration that snaps loose intermediate size wedging particles, and you have wide open mesh for full capacity production on long, non-stop work schedules.

Users are reporting that FlexElex pays for itself in less than a year's time. Send for Bulletin 15-J and operating experience data.

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915 Glasgow Avenue, Fort Wayne, Indiana

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The Frog, Switch & Mfg. Co.

Established 1881 CARLISLE, PA.

is fed from both ends and discharges through ports in the shell at the center line. As the sand from the latter mill goes to banks of classifiers used for production of natural sand, no accurate screen analysis is available for this unit.

The sand fractions from the various screens in the coarse and fine gravel section and from the crushed gravel sections are dropped by chutes to the sand classifiers. The set-up includes Dorr sand washers, bowl and rake classifiers, hydroseparator, Bodinson classifiers and a home-made sand drag. Sand produced from the two large Marcy rod mills does not get into this system. The sand from the small Marcy, however, does enter into this production section. Retreatment of the overflow from five of the main classifiers, plus that from the sand drag, is designed to recover the finer sizes of sand by means of the bowl classifier and the hydroseparator with the sand recovered from these units pumped back to the main classifiers. Belt conveyors carry the finished sand to the ground storage area.

Officers of the company and official personnel at the plant include: Edgar F. Kaiser, president; E. E. Trefethen, Jr., executive vice-president; R. S. Barneyback, vice-president and general manager; Ivor R. Thomas, assistant general manager; Bart Carter, plant superintendent; Arnold Abrott, chief engineer; Jack Heck, plant engineer; Henry Bayley, plant purchasing agent; William Greeno, pit foreman; Charles Jones, plant foreman; and Herb Hachman, loading foreman.

Winner in Fleet Contest

WESTERN MASSACHUSETTS SAND & GRAVEL, INC., Westfield, Mass., was named one of the winners of the Connecticut Valley fleet contest, sponsored by the Hampden County Accident Prevention Council and affiliated organizations.

The 72 competing fleets, comprising approximately 2000 vehicles, traveled 3,721,431 miles in September without a personal injury. Property damage accidents amounted to 0.91 per 100,000 miles. Western Massachusetts Sand & Gravel, Inc., with a fleet of 13 trucks, traveled 35,245 miles without an accident.

Safety Films

NATIONAL GYPSUM CO., Buffalo, N.Y., has announced the completion of a series of sound-slide films on safety. The series is designed to be presented in four 45-min. discussion training sessions for plant employes. The films highlight factors which affect efficient production. The elements of industrial accidents are presented, followed by a discussion of how accidents are a major cause of production inefficiencies. The series demonstrates that, although accidents may not necessarily involve personal injury, they may result in thousands of dollars worth of machine down-time.

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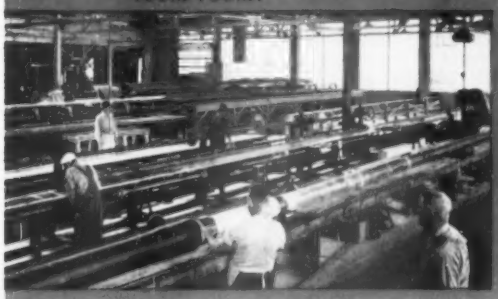
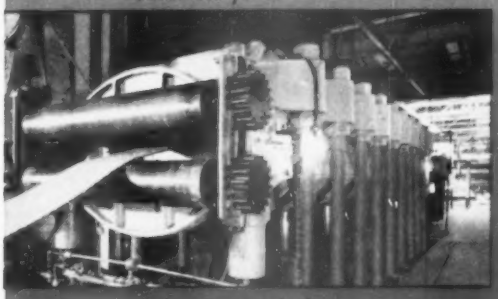
FIRE HOSE *jackets being woven in loom room.*



INDUSTRIAL HOSE *for the biggest and smallest jobs.*



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MOLDED RUBBER *products to fit your needs.*

Built by *American* **means**

Designed *by experts*

Built.... *by craftsmen*

Tested..*at every step*

Are you interested in a fire hose that will work for you for twenty years, and still be young enough to deserve recoupling — a dredge discharge hose that will last a year instead of six weeks — or a conveyor belt that will last twice as long as the one you are now using? That is the kind of performance American's CRACKER-JACK and BEAR brands of rubber products often deliver. Skillful designing, building, and testing to meet your own requirements will pay off in *your* operations.

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THE AMERICAN RUBBER MFG. CO. · OAKLAND CALIF.

Using a Sauerman rapid-shifting scraper machine, the 60 tons of clay required hourly in operating the new wet process cement mill of La Tolteca Cia de Cemento Portland, in Hidalgo, Mexico, is produced cheaply from a huge nearby hill. The scraper digs from top to bottom of the hill and delivers to a hopper at the washmill.

In former years, clay was dug from the hill with picks and shovels for a dry process mill at this same site. A gang of 58 men was used to loosen and shovel the clay into small cars that were hauled to the mill. Now one man and a Sauerman machine does all the digging and hauling as shown in the picture above.

Write today for the Sauerman Catalog

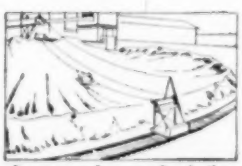
Boost Output! Slash Costs! the SAUERMAN Way!

Savings in equipment costs, economy of operation, and rapid, efficient haulage over long or short distances are just three of the advantages that make Sauerman Drag Scrapers and Cableways a profitable investment for a wide variety of materials handling operations.

Sauerman machines reach across or into water or bog, down into pits, up to the top of a hill, or across a wide stockpile. The efficient Crescent Scraper or Cableway bucket is controlled by one man from a safely located operating station overlooking the work site. Need for sending men or equipment into soft or dangerous areas is eliminated. Only the most expendable parts of the equipment contact the material handled, so that wear is slight and maintenance is accordingly low.

There is a size and type of Sauerman machine suited to your particular requirements. The moderate initial cost of a Sauerman Scraper or Cableway will prove a highly profitable investment for you in terms of years of steady service at minimum expense.

Sauerman Scraper Excavator


Sauerman Scraper Stockpiler

Sauerman Slackline Cableway

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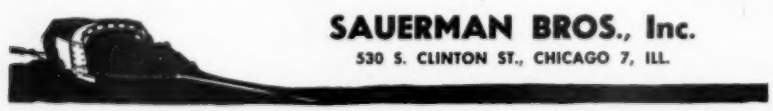

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Farrel-Bacon provides a complete engineering service, including design of plant and supplying all equipment from primary crusher to bin gate. Jaw-type crushers are available in sizes from 60" x 48" to 10" x 7" Write for complete information.
FARREL-BACON
ANSONIA, CONNECTICUT
BA 5

Missouri Agstone

(Continued from page 160)

Much of the discussion revolved about the crushed stone requirements to fulfill Missouri's 10-year road program. In many places good material is scarce and producers will have to resort to methods such as selective quarrying to meet specifications. In fact, the need for better adherence to specifications was reiterated many times by the highway engineers. There has been considerable trouble with gradations crowding specification limits, with barely enough minus 40-mesh material to be acceptable for granular base course.

Missouri's 10-year program calls for 12,000 miles of new road, to be incorporated in the state highway maintenance system in six years, then brought up to state standards within the 10-year period. The County Aid Road program (King bill) will continue on the same basis as in the past.

A question was asked whether the highway department could buy maintenance material from a portable plant located in a potential road construction area before this plant is moved to another location. Material would be stockpiled by the producer until the state used it during the year. Such material could be sold to the state for less since the producer would already have moved the plant in. The answer was that the state has to buy materials on a bid basis, but that requirements will be made known earlier in 1953 so bids can be received as early in the season as possible.

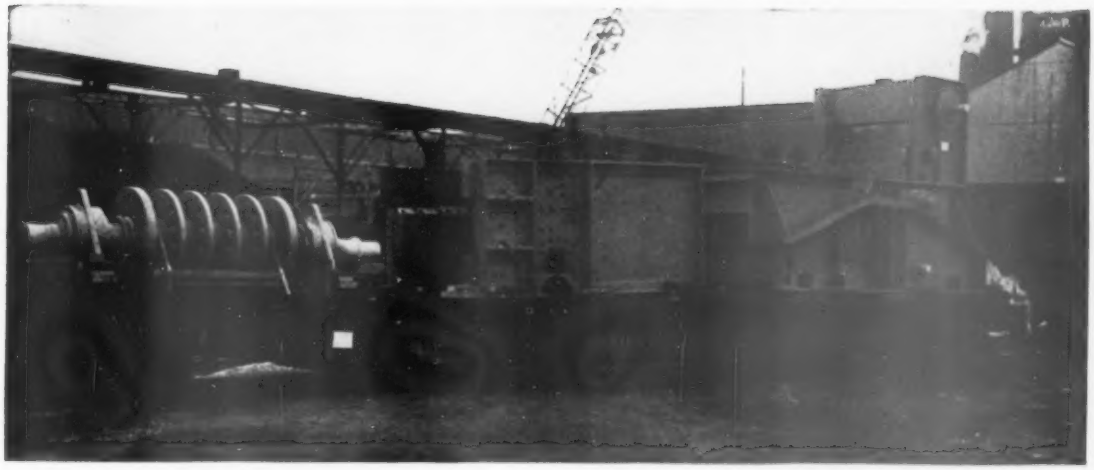
At an earlier membership meeting roads had come up for attention when Harlo J. Dunn, executive secretary of Missouri Good Roads Association, described the public relations activities of that association in its quest for better roads.

Social Notes

Following the cocktail party, the highway engineers and their member hosts attended the banquet, the largest the association has held to date. Speaker for the evening, introduced by toastmaster Ben P. Donnell, Valley Dolomite Corp., Bonne Terre, was Dave Livingston of Washington, Iowa. His review of the farmer's situation was punctuated with many of his good stories.

Wins Zoning Dispute

STEERS SAND AND GRAVEL CORP., New York, N.Y., which has operated a sand and gravel plant at Northport, L.I., N.Y., for more than 25 years, was recently granted permission to extend its operations over a 50-acre site where zoning regulations had formerly prohibited such expansion. Following a long and bitter controversy, village residents voted approval, by more than two to one, to allow the extended operations. In return, the company has agreed to rehabilitate the area.



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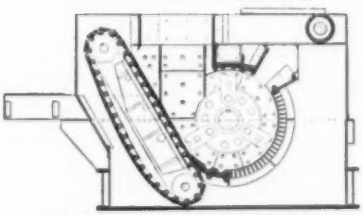
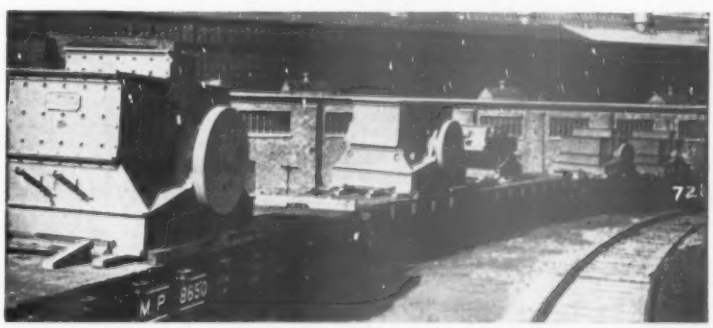


Ask for List of Installations

ASK FOR LIST OF INSTALLATIONS



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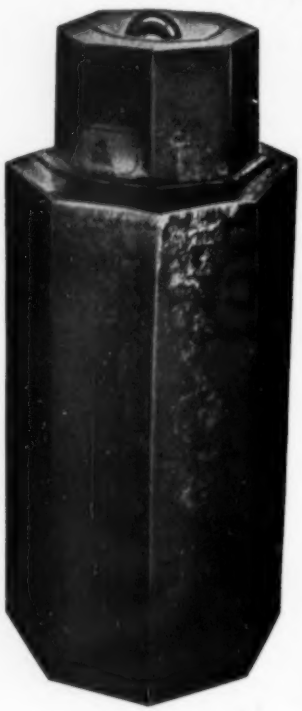

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Used by leading quarries for *economical secondary breakage.*

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Prompt Shipments

For further information write—

Cape Ann Anchor & Forge Co.
Post Office Box 360
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Outlook

(Continued from page 107)

than of men. The future is one of opportunity for business and industry for constructive forward planning along economic and social lines.

"It seems likely that controls on certain types of construction and materials will be eased or eliminated in 1953. This will stimulate construction such as highways, commercial, hospital, institutional and recreational building which will offset a probable reduction in industrial construction.

"We expect total dollar volume of construction in 1953 to approximate that of 1952 with perhaps a slight decrease in physical volume. Cement industry shipments may be reduced slightly from the peak attained this year which is likely to be better than 245 million barrels. For eight consecutive years industry shipments have exceeded the previous year.

"Barring any deterioration of the international situation we believe all controls will be eased or eliminated as soon as possible, thus permitting the law of supply and demand to operate once again.

"Our business in 1952 will be less than in 1951 due to strikes of two months' duration at four of our plants. Strikes at other plants also created deficiency areas so far as cement was concerned but shipments from surplus areas solved the problem reasonably well. Therefore, there has been no overall shortage this year."

Portland Cement (East):

"As to the year 1953, we expect to have capacity business and at prices not less than our present f.o.b. prices. Due to the construction of the New York Thruway and the heavy requirement for other road and street construction we expect that field to take up any loss that may occur in industrial and residential building."

Concrete Products (Calif.):

"I believe that the volume of business will hold up through 1953, compared with 1952. Probably a little heavier percentage on industrial and commercial will be noted.

"We contemplate a limited amount of modernization and expansion in 1953. Nothing is planned of a large nature.

"We have hope of a gradual easing of labor, equipment, and government regulations, although probably not much during 1953. However, I feel the trend will be in that direction.

"Business in 1952 exceeded 1951 by a moderate but satisfactory amount.

"To sum up the matter, we feel that in California business will continue to prosper, with the heavy influx of out-of-state population and money. Also, the state is in a good position to assist should any recession appear."

Limestone and Lime (Mass.):

"It is my opinion that prices for 1953 will be no higher than for 1952, even if price controls are removed. The volume of business in building will, in my opinion, be somewhat lower. In Massachusetts, highways and other public works probably will continue at a high level, because of funds appropriated. You did not ask with regard to agriculture, and I feel that while the Agricultural Conservation Program will continue through 1953, because the appropriations have already been authorized by Congress, I am very suspicious that there will be a tendency to reduce the Agricultural Conservation Program appropriations, which is apt to result in a very substantial falling off in the agricultural limestone business .

"Our gross sales in 1952 are greater than 1951, and our business has been divided between agriculture, industry and building, roughly on the tonnage basis of 60 percent agriculture, 20 percent building and 20 percent industrial."

Crushed Limestone (Ohio):

"The volume of business in 1953 should be substantially greater than in 1952 for our company, particularly for products shipped to the steel industry; that is, of course, assuming there are no lengthy shutdowns in that industry in 1953.

"The percentage of industrial business is apt to be greater in 1953 for the reason that there were stoppages in this area of our business, as compared to the sales to the construction industry."

Concrete Products (Ill.):

"Our 1952 volume was nearly equal to 1951, but profit margins are way down indicating that cost of operation has increased in the manner of a creeping paralysis and will be a major factor in determining price structures for 1953."

Ready Mixed Concrete (Mass.):

"We expect that our business for 1953 will equal 1952 and if we are able to obtain enough cement we expect to do more than in 1952. We have had quite a bit of residential work and industrial jobs during the past year and there has been an increase in our highway and public roads program during the later part of the year. We believe the highway and public roads program will be accelerated in the year to come and that we will have a decrease in residential and commercial building. The decrease in commercial building will be taken up by increases in public buildings such as schools, churches, and other buildings of this type.

"During the past year our business increased slightly and was hampered by the cement shortages during the past four months. Our residential work decreased about 10 percent, our commercial work was about the same as in 1951, our public buildings increased about 5 percent and we had an increase of about 10 percent in our public roads and highway work."

Ready-Mixed Concrete (Ill.):

"I would anticipate that volume of

A complete line of Flights and Accessories for new and replacement service. A compact conveyor — no return strand — can be made dust-tight.

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6

Outlook

(Continued from page 192)

business would hold up in 1953 to the same degree as in 1952. There will probably be an increase in road work and allied improvements. Also there probably will be more remodeling than in 1952. We will have a price advance at the beginning of year in our product—about 7 percent above present prices.

"We will continue to modernize—with elimination of older equipment that is costly to maintain, and not efficient in our operation. This modernizing will also give us greater capacity, which of course means expansion.

"The year 1952 was the best year we have had since starting in the ready-mixed concrete business. We started in 1945—and every year has been progressively better, with 1952 being our banner year. We would estimate that 60 percent of our business was directly with contractors—with 40 percent of our business being to home owners, farmers, private businesses, etc.

"We believe that service-type businesses such as ours will continue to grow and enjoy a greater share of the market. Many factors call for this—high wages, high transportation costs, better job coordination, less wastage of materials, better products, and we do find that the smaller contractors do not wish to invest money in equipment to do the same work that we can furnish to them."

Ready-Mixed Concrete (Colo.):

"According to our market survey, just completed, of the known and potential building program for this area for 1953, we believe that the volume will be about the same, possibly a little higher than in 1952. We can see no way for a lowering of our prices during the ensuing year. As a matter of fact, our costs will be higher, due to a definite demand for higher wages to be effective January 1, 1953.

"Indications are that the residential market may decrease a small percentage; however, commercial, industrial and public school construction will show a fair volume gain for 1953. Concrete highway work in the area will be less than in 1952.

"The concrete volume in 1952 was below 1951 in our metropolitan area. Market-wise, volume was higher in 1952 in residential construction but lower in commercial, industrial, highway and other public works construction."

Industrial Sand (East):

"We expect business tonnage-wise to be greater in the first six months of 1953 than it was in the first six months of 1952 barring strikes in our customers' plants. For the second half of 1953 we look for a decline in volume of probably 20 percent from the last half of 1952. We cannot divide our markets because the bulk of our business goes to one industry alone, namely the foundry. Our 1952 business is about 15 percent less than it was in 1951."

Portland Cement (Calif.):

"Our company's sales volume during 1952 almost equaled our 1951 total which established a new high record in the company's history. Our business for 1952 would undoubtedly have exceeded this 1951 record by a substantial margin had it not been for two unfavorable developments which depressed cement sales throughout the Northern California market: (1) the unprecedented amount of rain which shut down construction almost completely in this part of the country during the past winter, and (2) the Northern California carpenters' strike which lasted from March 31 to June 6, 1952.

"With the completion this month of our plant expansion program we will have a 50 percent higher plant capacity in 1953 than we had in 1952. Since we expect construction activity to continue at a high rate during 1953 and the demand for cement likewise to be strong, we will probably increase our shipments substantially during 1953. During 1952, public works accounted for a major share of our sales. Our deliveries to reclamation projects will probably be somewhat lower in 1953 than in the preceding year, but shipments to school and highway projects and to military installations—especially the latter—should be somewhat higher. Construction volume for residential and commercial building should be maintained at high levels during the coming year because of continuing population increases in California and the relaxation of government controls on credit and materials."

Plant Expansion and Modernization

Quite a number of producers of aggregates are contemplating new plants, several of which (sand and gravel) are being built at new sites due to deposit depletion. Others are enlarging to produce masons sand and other products, some are enlarging and many have keyed their programs for equipment replacement and modernization to take advantage of technological progress in improving efficiency. Some few crushed stone plants are to be equipped for producing fine products in the range below ⅜ in. while others are modernizing quarries to cut costs.

In the cement industry, it is apparent that there is much planned plant building, enlargement and improvement that is being deferred in the expectation of an improved tax structure. Nevertheless, a considerable amount of work is to be continued, regardless, to be financed largely from current earnings.

Two new slag plants are to be built, one in southern Ohio and the second, at the new Morrisville, Penn., plant

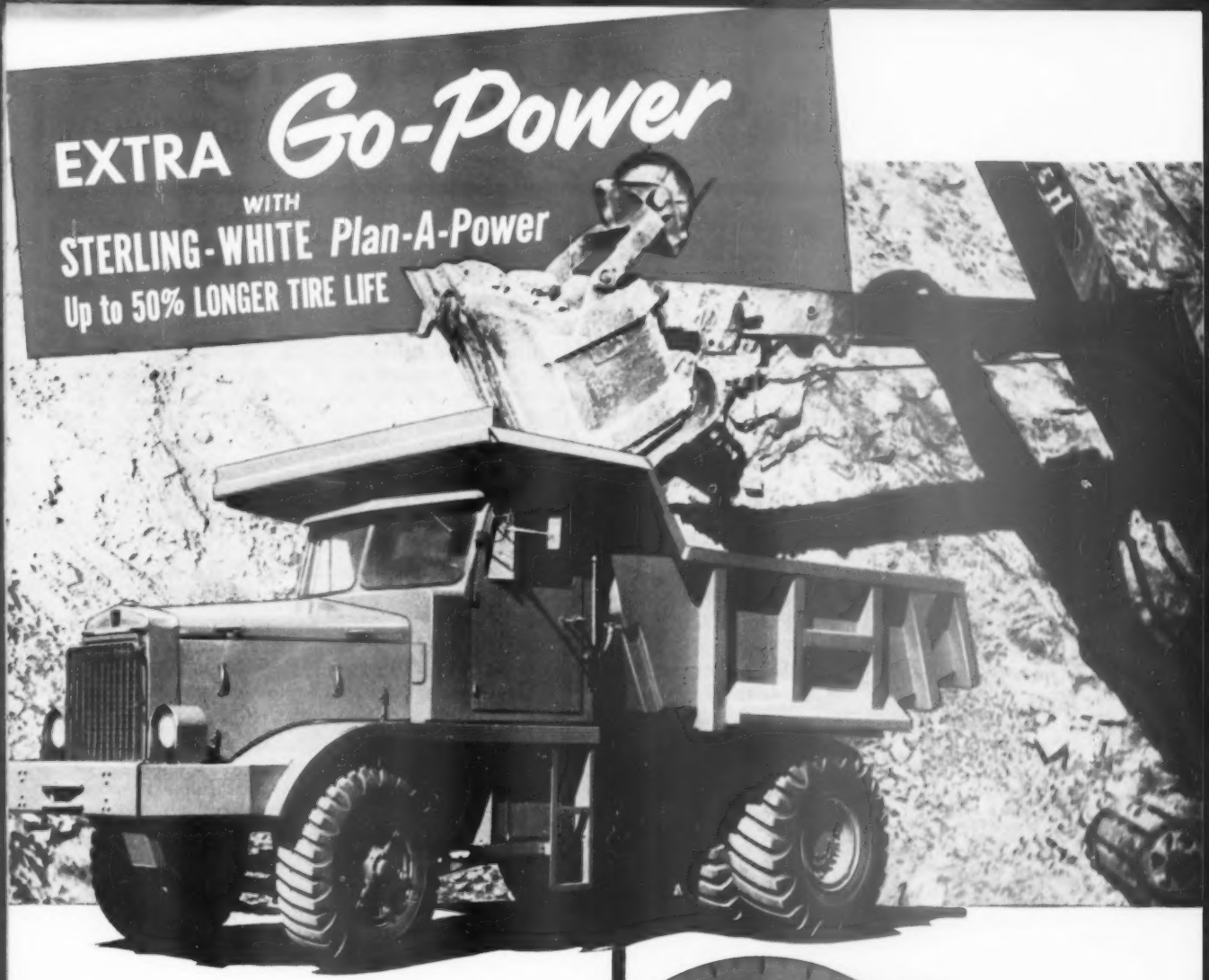
(Continued on page 206)

EXTRA Go-Power

WITH

STERLING-WHITE Plan-A-Power

Up to 50% LONGER TIRE LIFE



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Wheel spinning and slippage reduced to a minimum because you really get the traction . . . get the action . . . with the big loads. Super-traction differential divides power to each rear wheel exactly as road and load conditions demand. Maximum strength for more go-power . . . for 50% longer tire life. Your Sterling-White Representative will show you why.

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Maximum Strength — Minimum Weight in this exclusive two-section shovel boom. Lower section, rigidly connected to the A-frame, has ample strength to take shock loads. There is no torsion in the tubular handle . . . it is free to rotate in the cylindrical saddle block. Independent rope crowd with crowd machinery on the main deck means low swing inertia and faster cycles.

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Quick-Action Propel — The 150-B's propel machinery can be quickly engaged for faster move-ups or for getting away from slides. Less time lost in moving pays off in higher output.

Heavy-Duty Construction means less downtime, lower maintenance costs. Larger, stronger lower works stand up to rough quarry duty. Box-section caterpillar treads have separate paths for rollers and driving tumblers. Treads stay in adjustment longer and resist wear better.

These big advantages, plus improved Ward-Leonard rotating variable voltage control, mean faster cycles and higher output in hard digging. In addition, the 150-B is readily convertible to independent-motor powered dragline service.

114L52C

● **Digging and Loading Limestone** in this Ohio quarry, the new 150-B is giving its owner topnotch performance. "We're obtaining very good results," he reports.

INFORMATION

You can obtain catalogs listed on these pages by merely checking and mailing the coupon below

TO HELP YOU MEET TODAY'S PROBLEMS AND TO MAKE PLANS FOR TOMORROW

1 AIR COMPRESSORS — Worthington Corp. has released a specification sheet. (No. H-605-B2) on the Monobloc air compressors. This sheet describes features such as feather valves, aluminum cylinder head, deep finned cast iron cylinders, aluminum crankcase, etc.

2 BAG HOLDER—Richardson Scale Co. has published Bulletin No. 0452 covering four different types of bag holders. The bulletin includes nine photographs and gives operating details and recommended applications for clamp, inflated-ring, cable and cam grip types of holders. Two pages of drawings and specification tables give dimensions, installation data and utility requirements of the air operated types. Manual types are also described.

3 BELTING—Brammer Corp. has published a new data book, No. 205, giving facts on its V-link belting. Contents include sizes, prices, advantages, selection table with power factors and assembly, installation and maintenance instructions.

4 BULLDOZERS—Caterpillar Tractor Co. has published a booklet, Form 30504, titled "Pay Dirt Push" describing recent bulldozer operations in many areas. The company's equipment is shown doing pioneer, stockpiling and stripping as well as other earthmoving jobs. Examples are given of the application of cable and hydraulic controlled blades.

5 CHANGEROOM DESIGN—The Moore Co. has published a 16-page illustrated booklet, entitled "The Design and Layout of Industrial Changerooms." Architectural standards, dimensioning, equipment and safety features are discussed. Several photographs of changerooms and sketches to indicate many of the details in laying out the entire room are included.

6 CONCRETE—*Concrete* has published a book titled "Manufacture of Concrete Masonry Units," by William Grant. The 184-page book contains figures, tables and charts. A brief history of portland cement manufacture is included. An 8-page index lists the subjects covered. The book may be obtained from *Concrete*, 400 W. Madison St., Chicago 6, Ill., for $4.

7 CONVEYOR BELTS—Barber-Greene Co. has published an 8-page bulletin describing its conveyor belting. Pictured and discussed are the major causes of belt failure; belt selection tables are given and specifications are included. Representative types of belt protective equipment made by the company are also treated in the bulletin.

8 CONVEYORS—The Rapids-Standard Co., Inc., has published a revised 28-page catalog on its complete line of conveying equipment, with photographs, drawings and specifications.

9 CORROSION—The Babcock & Wilcox Co. has issued Bulletin TR-514 which discusses corrosion as a major factor in shortening the life of boiler tubes. The article indicates that, in low pressure boilers, corrosion is the largest single cause of replacement of boiler tubes. It points out the various types and causes of corrosion and offers a number of general rules to follow to get maximum service life for boiler tubing.

10 COUPLINGS—Thomas Flexible Coupling Co. announces the distribution of its latest engineering catalog, No. 51, describing its full line of all-metal flexible couplings for power transmission. Engineering data, keyway data, standards for straight and tapered bores are included. Catalogs are available to qualified personnel of firms interested in flexible couplings for power transmission.

11 CRUSHER REBUILDING—Stuls-Sickles Co. has released a folder on how to save time and money by rebuilding and repairing various types of crushers with Manganal, 11 percent-13½ percent manganese-nickel steel. One section of the folder concerns low spots on roll crushers. It explains how to cut build-up welding time to a minimum on hammermill hammers.

12 CRUSHERS — Stephens-Adamson Manufacturing Co. has issued Bulletin 12-C on its line of crushers. The various models are illustrated and capacities, maximum sizes handled and power required are given. Dimensions, application and comparative data are also included.

13 DIESEL ENGINES—Nordberg Manufacturing Co. has announced the publication of 12 two-color, two-page specification sheets on its Type 4FS one-, two- and three-cylinder diesel engines. These bulletins give complete engine specifications, equipment data and outline drawings of the various engine models. Bulletins 208, 209 and 210 describe the diesel generator unit 4FS1, 4FS2, and 4FS3, respectively. Bulletins 211, 212 and 213 describe the diesel engine with stub shaft, bulletins 214, 215 and 216 describe the diesel engine with clutch power take-off, and bulletins 217, 218 and 219 describe the diesel pump unit.

14 DUST FILTER—Dracco Corp. has released Bulletin 304 on its multi-bag filter for dust control. Cutaway views, drawings, and on-the-job illustrations are given. Specifications and a volume and resistance table are also included.

15 EARTHMOVING — Caterpillar Tractor Co. has released Bulletin No. 30510 titled "Stripping the Earth." The 8-page color booklet discusses such surface mining problems as stripping, hauling, uncovering and washing.

16 ELECTRODES—Alloy Rods Co. has released Bulletin AR52-2218 on its "Nickel-Arc 60" electrodes for machinable welds on cast iron. Illustrations of repairs are shown and recommended amperage range is listed.

17 FANS—Westinghouse Electric Corp. has announced Bulletin SA-6873 which describes 11 sizes of new industrial fans and their standard wheels. A table of condensed specifications on performance and dimensions is given plus discussion of the three available wheel types and typical applications for each. Fan arrangements are shown and described.

18 FEEDERS—Fuller Co. has published Bulletin F-4, "Fuller Feeders and Rotary Valves." The bulletin has diagram drawings, capacity tables, specification tables and cutaway views of equipment. A list of the material handled by the feeders is appended.

19 FLOTATION—Denver Equipment Co. has released Bulletin No. F10-B13 titled "The Unseen Factors in Flotation." The factors which govern flotation recovery are explained and results of competitive tests on identical feed are given.

20 FORK LIFT TRUCK—Transitier Truck Co. has issued a 38-page binder on its line of Hi Duty lift trucks. Specifications, power features and accessories are listed and explained.

21 HARD FACING—Wall Colmonoy Corp. has announced catalog No. 77 covering its line of hard-facing alloys. Applications, special alloys, standard castings and a guide for typical applications are given.

22 HISTORY—Ingersoll-Rand has published a 36-page pocket-size booklet presenting a brief history of the company, its plants and products and giving little known facts about the company. There are nearly 100 pictures showing the company's products in use. The booklet is titled "Our Latchstring Is Out."

23 HOISTS AND BODIES—St. Paul Hydraulic Hoist has announced an 8-page catalog titled "You'll Earn More with . . . St. Paul Hoists and Bodies." The bulletin includes a list of the improvements in the new line, specifications and payload capacities.

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24 HOSE CLAMPS—Hose Accessories Co. has announced Bulletin No. 125 on its complete line of Le-Hi hose clamps. It contains information on all types and sizes of clamps, their capacities and application details. Illustrations of nine models of clamps are included.

25 HYDRAULIC COUPLING — The Twin Disc Co. describes its new disconnecting hydraulic coupling in Bulletin 500. The bulletin presents diagrams of the Model HUD, explains new features and includes illustrations of the cooling circuits. A horsepower range chart is included.

26 INDUSTRIAL HOSE—Thermoid Company announces the publication of an 8-page pamphlet, Form No. 3680, describing its new "basic-five," color-coded, multi-purpose industrial hose line. The new publication gives details of construction, sizes, lengths, pressures, recommended couplings and uses for the hose line.

27 INSULATION — Gustin-Bacon Manufacturing Co. has compiled a short handbook entitled "Ultralite Insulation For Hot and Cold Piping." It describes the physical properties of Ultralite and gives technical information, thermal efficiency ratings and limitations. Information on sizes and packaging is also included.

28 INSPIRATORS AND BOOSTERS — Hauck Manufacturing Co. has released catalog No. 806A, describing its improved type and sizes of high pressure gas-air inspirators and boosters for industrial furnaces, ovens, kilns, dryers, etc. Normal capacity tables, correction factors, dimensions, and operation diagrams for both products are given.

29 LIFT TRUCK OPERATION — Hyster Co. has issued a manual called "How to Operate a Lift Truck." It includes safety and loading suggestions, basic maneuver patterns and a maintenance record.

30 LOADER—Brisson Bros. Machinery Co. has released a bulletin on its "Lodal," truck self-loader. Claimed advantages, power features and specifications are given.

31 LUBRICATION — The Texas Company has released Vol. 38, No. 8 of its publication "Lubrication." This issue is devoted to the "Modern Bus and Truck, Fuels and Lubricants, Part I." Engine fuels, motor gasoline, octane rating, preignition, volatility, etc., are discussed and engine power charts and characteristic tables are also given.

32 MOTOR GRADERS—Caterpillar Tractor Co. has issued Form 30529 which describes its models 12, 112 and 212 motor graders. Engineering features are discussed.

33 MOTORS — Allis-Chalmers Manufacturing Co. has issued Bulletin No. 05B7771, describing the standard construction features and types of construction of its large pedestal-bearing induction motors.

34 PRIME MOVER—Caterpillar Tractor Co. has issued Form 30334 describing the four-wheel DW20 prime mover. Included in the booklet is such DW20 equipment as the Caterpillar W20 wagon, No. 20 scraper and Athey PD20Q trailer.

35 PROSPECTING—Geophysical Instrument Co. has announced publication of Circular No. 101, describing its "Geovolt" apparatus. This apparatus has been developed for the purpose of prospecting for certain types of mineral deposits. The circular describes and pictures the components of the apparatus and outlines the theory of operation.

36 PUMPS — Ingersoll-Rand has released Form 7223 covering general purpose centrifugal pumps of the cradle-mounted type. The bulletin covers five basic cradle groups and 17 corresponding pump types, their capacities, horsepower ratings and uses. There are also two pages covering pump dimensions and a table of performance under 60 cycle use. Two pages describing special purpose units and design modifications are included.

37 REDUCER—Dodge Manufacturing Corp. has brought out Bulletin A-614-A which offers engineering information and selection data on its complete line of torque-arm speed reducers and overload release, designed for use with it.

38 SAFETY SHOES—Safety First Shoe Co. has released a catalog on its line of steel-toe safety shoes. Included in the new catalog are color reproductions and cutaway drawings of styles equipped with air cushioned innersoles. Other portions contain photographs and facts about the regular line of "dress" and work shoes that the company manufactures.

39 SCALES—The Howe Scale Co. has released a folder describing its line of axle load scales. Form 682 reviews the features of weight control, construction details, specifications and pit dimensions for the nine standard axle load scales.

40 SCRAPER—The Euclid Road Machinery Co. has published Form No. 501 on its 15.5-cu. yd. scraper. The 8-page catalog describes and illustrates major design features and provides detailed specification data.

41 SPEED REDUCER—Cleveland Worm & Gear Co. has issued a booklet on speed reducers. These are illustrated and described.

42 SPROCKET WHEELS — Link-Belt Co. has published an 8-page booklet, No. 2467, which lists over 200 sizes of cast tooth sprocket wheels. The booklet tells how to select stock sprocket wheels fitted to the chain.

43 STEAM GENERATOR—Littleford Bros., Inc., has released two bulletins on its "Kwik-Steam" generators. The various models are illustrated and engineering data are included. A typical layout is also given.

44 TRACTOR—Caterpillar Tractor Co. has issued Form 30505 describing its DW21 tractor with No. 21 scraper.

45 TRAILERS—Gar Wood Industries, Inc., has issued Bulletin W-105 describing its line of trailer hoists and bodies. The 4-page booklet illustrates and describes Models TV35 and T4430 telescopic hoists as well as the F8C and F77C cam and roller hoist. Capacities and specifications are given.

46 TRUCKS—Euclid Road Machinery Co. has issued revised catalog literature covering its 13-cu. yd. bottom-dump trucks. This 16-page folder details the features and general specifications of the models 70 and 71FDT-89W trucks.

47 WATER REPELLANT — L. Sonneborn Sons, Inc., has released data sheets on its water repellant in aqueous solution, Hydrocide S.X. 2210. Advantages, directions, coverage, functions and test data are given.

48 WIRE CLOTH—Multi-Metal Wire Cloth Co., Inc., has pubsished a 126 page catalog on wire cloth, filter cloth and fabricated products. It contains specifications, characteristics and uses of wire cloth and filter cloth.

49 WIRE ROPE—Union Wire Rope Corp. has published Vol. 3, No. 8 of its educational bulletin "Rope Dope," entitled "Abuses of Wire Rope in Use." A chart classifying wire rope abuses is given and each is pictured and the cause is explained.

50 WIRES AND CABLES—United States Rubber Co. has published a 186-page general catalog of its line of more than 500 different types of wires and cables. The catalog contains data on construction and operating characteristics for the various types of cable and wire. A detailed engineering data section is also included.

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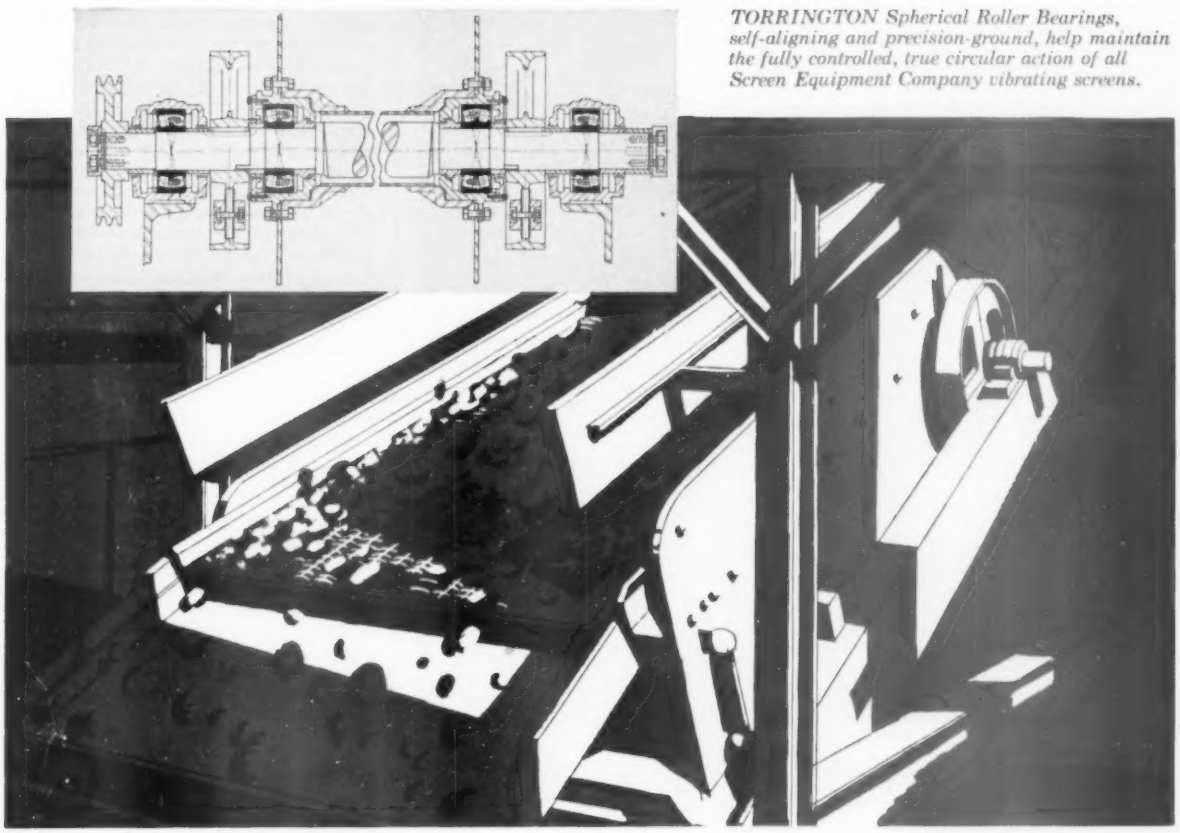
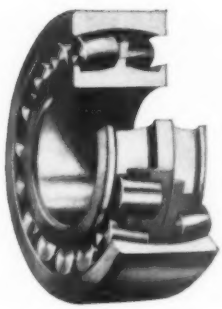


TORRINGTON Spherical Roller Bearings, self-aligning and precision-ground, help maintain the fully controlled, true circular action of all Screen Equipment Company vibrating screens.

Screening higher tonnages per day and per dollar!



Either way you look at it, per day or per dollar, TORRINGTON Spherical Roller Bearings help to increase tonnages from vibrating screens.

Self-aligning TORRINGTON Spherical Roller Bearings compensate for shaft deflection and frame distortion. They maintain sharp, accurate throw and a smooth flow of power under all operating conditions. Loads move along rapidly, carry-over is eliminated—and daily tonnages climb.

Precision-ground from the finest of bearing steels, TORRINGTON Spherical Roller Bearings resist the wear and tear of eccentric action. They cut maintenance to a minimum, lengthen service life, help you get, over the years, maximum total tonnage per equipment-dollar invested.

No wonder so many of the best vibrating screens—like the best crushers, pulverizers and other aggregate processing machinery—are equipped with TORRINGTON Spherical Roller Bearings.

Next time, specify TORRINGTON!

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TORRINGTON SPHERICAL ROLLER **BEARINGS**

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers

Eliminate 70% to 90% of Conveyor Downtime

U.S. Pat. No. 3548399—Others Pending

Cedarapids
Schrock
Built by IOWA

MOTORIZED HEAD PULLEYS

eliminate maintenance on chains, belts, sprockets, Universal drives, countershafts, etc.

EVERYTHING is contained INSIDE the pulley shell!

HERE'S a money-saving departure from conventional conveyor drives. A Cedarapids-Schrock *Motorized* Head Pulley is simply a new application of the long-proven gear reduction drive, with everything . . . electric motor, reduction gears and all moving parts . . . contained inside the drum, completely protected from grit, dirt and weather and with no outside parts or motors to service. 70% to 90% of conveyor trouble and downtime is saved by eliminating the exposed parts necessary with conventional pulley drives. In operation, the pulley shell rotates about the electric motor which is held stationary by a torque arm attached to the conveyor frame. The speed of the shell depends on the combined reduction ratio of the pinions and gears inside the shell. Compact, easy-to-install, job-proved Motorized Head Pulleys are available in sizes from 5 to 30 HP and in various widths.

Find out all the advantages of converting your belt conveyor or belt-bucket elevator installations to *motorized* efficiency before you need head pulley replacements. See your distributor today, or write for Bulletin MP-1.

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Cleveland Vibrating Screen Sections are *tough*, but ductile . . . accurately woven of production-tempered abrasion-resistant steel. *Increase your tonnage, reduce down time*, by installing *longer-life* Cleveland Wire Screens!

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THE CLEVELAND WIRE CLOTH & MFG. CO.
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California Aggregates

(Continued from page 149)

does not seem to be reproduced proportionately in job-mixed concrete.

Washing is required in the preparation of fine aggregate. Coarse aggregates generally are washed, although commercial producers are not required to do so if specification requirements can be met otherwise. Fine aggregate is required to be stockpiled after washing for at least 24 hours prior to being batched.

On the whole, specification requirements for concrete aggregates are not severe as compared to those in effect in the northern tier of states. It is felt that some relaxation in requirements is justified because of the mild climatic conditions that prevail in the greater part of the state.

Production Methods

For some years prior to 1944 the need had become increasingly acute for the standardization of sizes by users and producers of aggregates in California. A series of conferences resulted, in 1945, in virtual agreement on sizes and gradings that would best fit in with existing production and demand. Sizes thus adopted were similar to but did not coincide entirely with those previously developed under auspices of the U.S. Department of Commerce. Since there is very little trans-shipment of aggregates across state lines in this area, the need of conforming in exact detail to a national standard does not exist.

In accordance with the adopted schedule, concrete aggregates are separated and stocked in four primary sizes: plus 1½ in. minus 2½ in.; plus ¾ in. minus 1½ in.; plus No. 4 minus ¾ in. and plus 0 minus No. 4 (sand). The substitution of plus No. 4 minus 1 in. for plus No. 4 minus ¾ in. is permitted in Division of Highways specifications. These separated sizes permit recombination in the batching plant to any of the combined gradations required in specifications of the Division of Highways.

Means of improving the quality of sub-standard raw aggregate vary with the nature of the deposit and the resourcefulness of the producer. Scrubbers of various designs are used to remove coatings. In some cases, presoaking in the pit has been found to be of material aid to the washing and scrubbing process. Hand picking formerly was used to some extent to remove easily recognized particles of wood and clay balls. In general this method is now considered as costly and largely inefficient.

Soft stone eliminators are used efficiently to reduce the percentage of the softer shales, and are employed to a limited extent to improve granite aggregates. They are not particularly effective for the latter purpose, however, because of the presence of particles of all degrees of hardness. Much usable rock is removed while the softer varieties are only partially eliminated.

Some producers resort to "sweetening" with sound aggregates imported from considerable distances in order to obtain an average product that will meet soundness requirements. This method is often costly, and is not regarded as the best solution in improving sub-standard aggregates.

The major portion of concrete construction is in the vicinity of heavily populated centers that are well served by commercial plants. Contractors prefer to obtain concrete aggregates from established sources whenever possible rather than to set up roadside plants. A number of general contractors, however, own and operate commercial aggregate plants.

Depletion

Sand and gravel is usually thought of as being an unlimited resource. To a certain extent this is true, but again the supply is determined by the resources of the natural province. A greater demand due to new construction and an unprecedented increase in population is slowly depleting the readily available deposits making it necessary to go further afield in search of new ones. Possibly of greater effect is the advent of zoning regulations. Producers who originally set up plants in then rural areas contiguous to population centers now find themselves in the midst of residential sections and they are prohibited from opening adjacent pits or at times even of extending working areas within the boundaries of land acquired many years previously.

Summary

According to U.S. Bureau of Mines statistics, California is among the leading states in the production of sand and gravel. Although resources are virtually unlimited within the state as a whole, the distribution is such with respect to areas of demand as to make it probable that large quantities will long remain unused. On the whole the aggregates are of excellent quality or can be made so at reasonable cost by processing. Important amounts, however, carry reactive minerals which restrict the manner in which they can be used successfully. The corrective measure most frequently used is to require that the portland cement be low in alkalies and this entails added cost. Specifications, although designed to limit deleterious substances, are in general less restrictive than those in use in more severe climates.

Molding Sands

CHARLES B. SCHUREMAN, technical consultant, Barold Sales Division, National Lead Co., discussed "Modern Core and Molding Sands," before members of the American Foundrymen's Society, at their regional conference at Portland, Ore., October 24-25, 1952. Edward D. Boyle, master molder, Puget Sound naval shipyard, spoke on "Use of Mineral Perlite in the Foundry."

WHY Bantam® is the best 3/8-cu. yd. excavator for YOU!

BANTAM'S fast-acting mechanical controls, plus rapid swing and hoist, let you dig 90 cu. yds. per hr. with shovel or dragline, 80 cu. yds. per hr. with clamshell, 100' of 5' trench per hr. with hoe.

No matter how much extra you pay for a 3/8 cu. yd. *excavator*, it is physically impossible for the *operator* to get any more "pay yards" than the 6 passes per minute he gets with the *job-proved Bantam*. That's why Schield Bantam has specialized in building the *simplest, LOWEST-PRICED 3/8-yd. rig on the market* because job experience proves Bantam:

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When you consider the number of moves your operator must perform on every shovel cycle, (see below) it's just plain common sense to give him the lowest-priced machine that gets the most production out of these *10 operator moves:*

1 Load dipper
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3 Swing
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8 Stop at bank
9 Lower dipper
10 Start dipper load

NOTE: Similar "human limitations" apply to any excavator. So save money, buy Bantam.

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Includes complete basic unit, stick, shovel boom and 3/8 cu. yd. bucket. Price subject to change without notice.

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Typical Sly Dust Filter in a cement plant

In April 1948, a leading cement manufacturer installed an automatic-continuous Sly Dust Filter to ventilate four cement finish mills.

This filter is responsible for saving approximately $100, or 50 barrels of cement per 24-hour day. It has been in operation since installation without repairs.

Thus, this installation paid for itself in much less than a year. It is typical of the savings being made by SLY Dust Filters.

If you will tell us your dust problem, we shall be glad to estimate what you can save.

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Slag Meeting

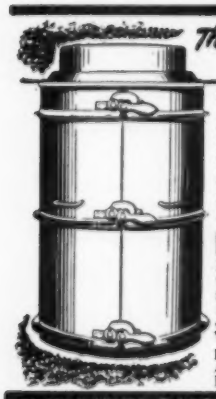
(Continued from page 166)

year. Reprints of this 8-page catalog will be made available to members for distribution, and this coupled with the wide distribution made of Sweet's File Service (29,000 copies) indicates that slag products will be given rather wide publicity.

The final report of the association-sponsored Ag-Slag Fellowship conducted at the Ohio Agricultural Experiment Station was just recently released, and members present were furnished a copy for review. Results reported are very favorable to slag as a liming material. Members were advised that several thousand copies of the report will be ordered from the experiment station and thus become available for distribution purposes.

Seek Slag O.P.S. Decontrol

Mr. Bauman reported on the efforts of the association to have slag decontrolled from O.P.S. and then supplemented by a petition to have an increase of the ceiling price on slag authorized, due to the increased labor rates similar to those of the steel industry which were imposed on slag processors at the same time the steel increases went into effect. O.P.S. staff members were openly criticized for their lackadaisical attitude and inefficient manner in the handling of the association's petition. Notwithstanding the fact that slag as a commodity was clearly demonstrated to meet O.P.S. standards for decontrol in every respect, they were very reluctant and evasive to accept the factual statement presented by the association. Evidently O.P.S. is deliberately ignoring the intent of Congress to have the agency decontrol those commodities as soon as possible that are not a factor contributing to the forces affecting inflationary tendencies. In the case of their handling of the petition for an authorized ceiling price increase, it was pointed out that the slag industry was the only one involved with blast furnace products, such as pig iron, refractories, coke, etc., that was not authorized an increase in the ceiling prices to allow



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The Quinn Standard is known as the best the world over, wherever concrete pipe is produced and used. Backed by over 35 years' service in the hands of hundreds of Quinn-educated contractors, municipal departments and pipe manufacturers who know from experience that **Quinn pipe forms** and **Quinn mixing formulas** combine to produce the finest concrete pipe at lowest cost.

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For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell end pipe at lowest cost. **WRITE TODAY.** Complete information, prices, and estimates sent on request. Also manufacturers QUINN CONCRETE PIPE MACHINES.

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EQUIPMENT DIVISION

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for the imposed wage increases. It was pointed out that months were often required to obtain an opinion from officials of O.P.S. As a final effort in attempting to get something definite from O.P.S. in the form of a decision, a Slag Industry Advisory Committee meeting was agreed to. This meeting with officials of O.P.S. was held in Washington, D.C. on October 16. Practically nothing of value resulted from this meeting so far as the industry was concerned. A so-called Industry Earning Survey was proposed, but the members felt it a wiser course of action to put up with existing price controls rather than be subjected to the ordeal of a long and drawn out survey under O.P.S. supervision, and decided to get along as best it could until such time as O.P.S. is abolished. It was hopefully predicted that under the new Administration the present wage and price controls would be one of the first so-called emergency regulations to go "out of the window."

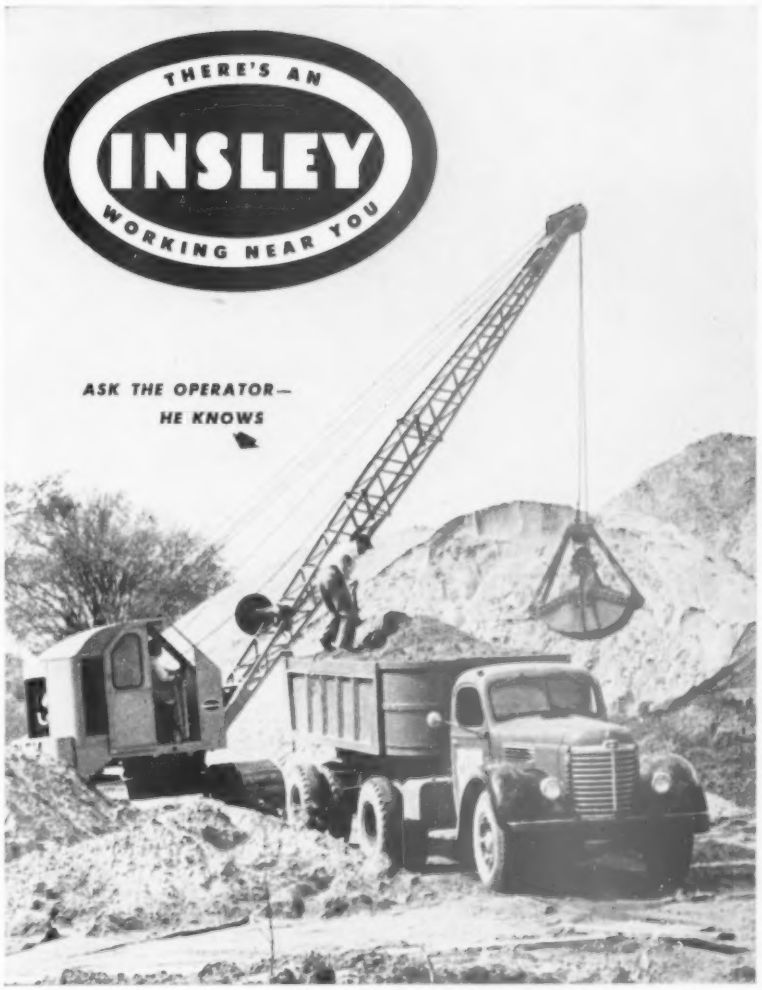
The National Slag Association sponsored Plant Safety Competition, under direction of the U.S. Bureau of Mines, is being participated in very actively by association members as well as non-members, and results obtained in the promotion of safety are most gratifying.

Mr. Bauman reported on many routine activities that are commanding more of the association's time. Many requests for information on slag are handled through the association's office. Considerable time is devoted to committee activity by the managing director as a representative of the slag industry. Release of master files continues an important function. During the past year the managing director has been working without an administrative assistant and the directors emphasized the need for obtaining a qualified man at an early date to assist in the many duties now confronting the association.

From the standpoint of membership and financial structure of the association, it was reported that it is probably in as sound a condition today as at any time in its entire history.

An interesting feature of this meeting was an afternoon devoted to a roundtable discussion of slag problems. Many members participated in this group meeting, and it was felt that similar discussion periods should be provided in future programs.

During the meeting of the Board of Directors on Thursday morning the budget for the forthcoming year was authorized and several resolutions, prepared by the resolutions committee, were adopted. The nominating committee made its report and the following officers were elected for the year 1953: C. A. Barinowski, president; R. O. Dierker, vice-president; E. W. Bauman, managing director and secretary; and W. S. Shaw, treasurer. Members at large, Executive Committee are: W. E. Bliss, R. K.



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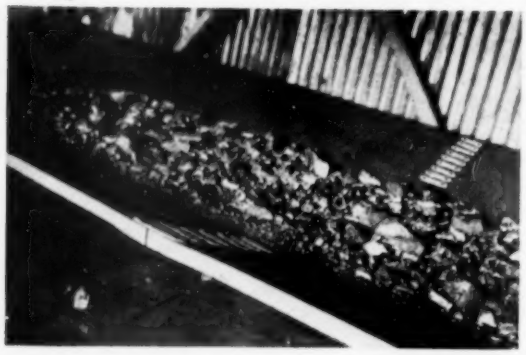

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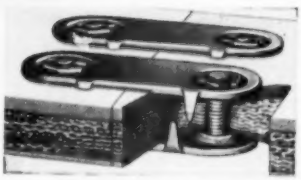

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Plumb, G. A. Mattison, Jr., and R. Newton McDowell.

The date and place for the mid-year meeting was not definitely fixed, but an invitation from the Houston, Texas member is being favorably considered. The exact date and place will be fixed by the executive committee during the early months of 1953.

Blasting Efficiency

(Continued from page 133)

ing effects (see Fig. 1), it is my present belief that timing between .015 and .035 second covers their effective range with maximum efficiency attainable near the peak.

In weak rock structures the point of maximum effective stress before collapse would naturally be expected at the early stages of delay, while a resilient rock formation would suggest a longer delay to allow the maximum pressure to develop.

With reversal of some of the older delay theories dependent upon letting the outer holes afford relief for the ones behind, it might be well to take another look at the choice of explosives for the work required, keeping in mind the fact that the higher percentage grades depend largely for their strength on nitroglycerin content, and high velocity of detonation is common to this type of explosive. Therefore, when using high velocity types of explosives, delay timing must be reduced in order that the secondary action of the following delays can take effect before the rock is opened up and the pressure due to the expansion of the first charge is thus released.

It would be logical to believe that the best results from millisecond delay action could be expected from the ammonium nitrate types of explosive with moderate detonating speed and high gas volume, providing that the borehole arrangement and the stemming are designed to remain intact for the secondary impact which produces such notable effect on the degree of fragmentation.

In Fig. 2, the effect of too much delay (in this case .07 seconds), is illustrated by the double impact at the seismograph station, but using four millisecond delays in two similar holes, with excellent confinement between the charges in the form of 30 in. of closely compacted sand, we note 100 percent better fragmentation using 640 lb. less explosive, while vibration was reduced by 80 percent, as recorded in Fig. 3.

In the analysis of seismic effects from blasting, we note that inefficiency demonstrates itself first in the longitudinal component which measures the reaction on the solid formation as the burden is propelled forward. The shear trace adds its evidence when boreholes are too far apart or the ends of the shot too tightly bound.

As vibration effects and efficiency are so closely related, the opportunity to use recordings as a means to at-

tain the most effective distribution of charges and the most efficient timing should not be disregarded.

Much remains to be learned about millisecond delay action, but it is evident even at this stage that some of the older theories applied to blasting may be discarded.

MANUFACTURERS NEWS

Air Reduction Co., Inc., New York, N.Y., announces that J. H. Humberstone, vice-president, has been elected second vice-president of the American Welding Society.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has announced the appointment of W. L. Vogeli as assistant director of engineering, tractor division. He was formerly agricultural tractor sales manager.

The Thew Shovel Co., Lorain, Ohio, announces that R. B. Miller, secretary-treasurer and director, has retired after 46 years of service, but will retain his directorship. Harry L. Reynolds, assistant secretary-treasurer and personnel relations director, has been appointed treasurer, and Waid V. Clark, controller, assistant secretary and director, has been named controller and secretary.

Round Chain Companies, Cleveland, Ohio, has appointed Donald E. Ehlenfeldt as advertising manager. He was formerly sales promotion manager for the Willard Storage Battery Co.

The Baker-Raulang Co., Baker Industrial Truck Div., Cleveland, Ohio, has appointed Industry Services, Inc., New Orleans, La., as distributor in Louisiana and southern Mississippi.

H. K. Porter Co., Inc., Pittsburgh, Penn., announces that Robert S. Sweebet has been named vice-president and general manager of The Watson-Stillman Co., Roselle, N.J., the hydraulic press division of the company.

Hyster Co., Portland, Ore., has appointed Machine Tools, Inc., Des Moines, Iowa, as distributor in a large part of Iowa.

United States Rubber Co., New York, N.Y., announces that Carroll C. Parker has been appointed assistant manager of grinding wheel sales of the mechanical goods division, with headquarters at Fort Wayne, Ind.

Arkell and Smiths, New York, N.Y., has appointed W. F. Nesbit as sales manager of the eastern division. He was formerly southern division sales representative in the Texas area.

The Foxboro Co., Foxboro, Mass., has expanded factory facilities at Dallas, Texas, for the assembly of control valves.

The Baker Raulang Co., Baker Industrial Truck Div., Cleveland, Ohio, has announced the appointment of the Baker Industrial Truck Co. of Wisconsin, Milwaukee, Wis., as distributor in Milwaukee and eastern Wisconsin.

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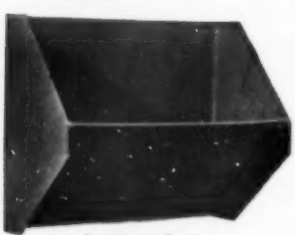

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Outlook

(Continued from page 194)

of U.S. Steel Corp. Capacity will also be increased at plants where new blast furnace capacity has been added.

Several lime producers report that modernization, deferred because of steel shortages, will be carried forward and two lime producers reported planning expansion to make new products.

In the concrete products industry, there will continue to be moderate expansion but principal types of specific work reported include the addition of storage facilities, new kilns and handling arrangements and equipment for the manufacture of lintels and other special shapes.

Typical of the comments about plant expansion and modernization were the following:

Crushed Stone (Conn.):

"We are now in the process of building a new, small plant to process minus ⅛-in. material into usable fractions."

Sand and Gravel (midwest):

"We have a comparatively minor modernization program set up for the plants which we have already established. As for new construction, we are building a new slag producing plant at Middletown, Ohio, and will have in operation a small plant in the area of the new atomic energy project in Pike County, Ohio."

Sand and Gravel (Minn.):

"We are going to build a new sand and gravel plant next year at Grey Cloud Island, and yard facilities at the Barge Terminal in St. Paul. The operation will be ready in the Spring of 1954."

Crushed Stone (Wis.):

"I believe that the practice of some engineers or rather some purchasers—of setting up certain specifications on which they request bids and, then later when they find that they have some lower bids, that do not quite meet the specifications, they revise the specifications to meet the lower priced material—is very bad practice. Many of the stationary plants which in turn provide employment for a definite number of people from one year to another suffer definitely by this practice. If it were known beforehand that a specification was going to be treated in slipshod manner and that, after all, price was the prime factor, it might put a different light on the entire situation."

Gypsum (Nevada):

"Our business is one of continued modernization to keep abreast of technical advances in our industry. This policy will be continued in 1953. We have embarked on a major expansion of our gypsum operations in Nevada which we hope to complete in the latter part of 1953. The products of this expansion will be marketed in Central and Southern California."

Ready-Mixed Concrete (Colo.):

"As to 'developments of special significance affecting our business and the concrete industry,' we have worked for years, in our engineering department towards more accurate design and batching control of concrete. We have, finally, perfected an absolutely accurate, instantaneous moisture meter for the measuring of moisture in sand and rock. A glance at the meter by the batching operator gives the moisture content of the aggregate to within ½ of 1 percent. A glance at our compensation chart allows the operator to either add or deduct sand or water, or both, as the meter shall indicate; thus, we have absolute control of our concrete slump, yield and, we have eliminated 'wet' and 'dry' loads which are a tremendous hidden cost to all concrete manufacturers. We have applied for our patents and plan to put the meter on the market so that the entire industry may profit by our development."

Portland Cement (midwest and south):

"In our own case, we are continuing our replacement program to the extent of the funds that can be made available. Some small capacity increases are involved in our 1953 program." This program totals $2¼ million spread over five plants.

Crushed Stone (Texas):

"We are now in the process of constructing a crushed stone plant for the general market and, of course, we do not anticipate any further expansion in 1953."

Portland Cement (East):

"We are just starting work on the first phase of modernizing and rehabilitating one of our plants, which was originally built in 1907. Construction will not interfere with shipments."

Handicaps

In striking contrast to the situation a year ago, the industry overall does not anticipate very serious difficulties to the conduct of business in 1953. The exceptions are cement shortages, prices and freight rate increases, which restrict market areas. There are instances of labor shortages that are causing some concern, in tight labor areas like Detroit, Mich., and there is more than normal labor turnover and unrest in some regions.

Aggregates and Ready-Mixed Concrete (Ill.):

"It is our intention to vigorously continue the modernization and expansion program, which we commenced five years ago. During that time our aggregates operations have been entirely revamped, and modern producing and handling equipment introduced. The same has been true of our trucking facilities, most of which has been replaced with new units during this period, and a large fleet of mixer trucks for handling ready-mixed concrete has been added. In addi-

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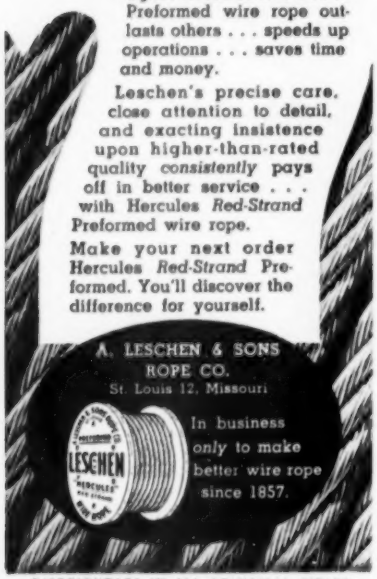

DISTRIBUTORS IN ALL PRINCIPAL CITIES

Outlook

(Continued from page 207)

tion new warehouses, garages and service facilities have been constructed at our various locations. This ambitious program has been undertaken to reduce costs and improve our services and products."

Portland Cement (New York):

"We are just now completing additional silo storage capacity of approximately 100,000 bbl., so designed that we can load trucks from the same."

Portland Cement (Calif.):

"We have already mentioned completion during December, 1952, of our plant enlargement program which has boosted our capacity by 50 percent. Only minor expansion or modernization projects are contemplated during 1953 except in the field of transportation. It is possible that we may enlarge our loading facilities and also increase the number of our transport trucks."

Crushed Stone (Missouri plants):

"In Missouri crushed stone producers are contemplating increased production capacities, not so much because the Republicans were elected but because of Missouri's new road-building program financed by a state gasoline tax which was increased in 1952 by 50 percent, from 2 cents to 3 cents per gallon. The State Highway Department is beginning to release statements of its expected demands for crushed stone to be used in the 1953 construction program. To date, these demands are about 50 percent greater than in the same areas last year."

Ready-Mixed Concrete (Kans.):

"We have a definite plan of improvements and modernization. This has always been a company policy, in order to give our customers the best possible in service and merchandise. We also have a projected plan of expansion to be put into effect if and when business should warrant it."

Crushed Stone (Pennsylvania plants):

"The modernization and expansion of our crushed stone plants in Pennsylvania is a continuing process, and we expect as much of it in 1953 as we have had in past years."

Ready-Mixed Concrete (Kans.):

"We do not feel that it will be necessary to increase our facilities during the coming year but do contemplate replacing some of our present equipment to keep in good condition for the proposed work."

Concrete Products (Mich.):

"A small amount of expansion is contemplated during 1953. This will be necessary in order for us to increase our efficiency in manufacturing of lintels and special shapes. Schools and churches require more of these units."

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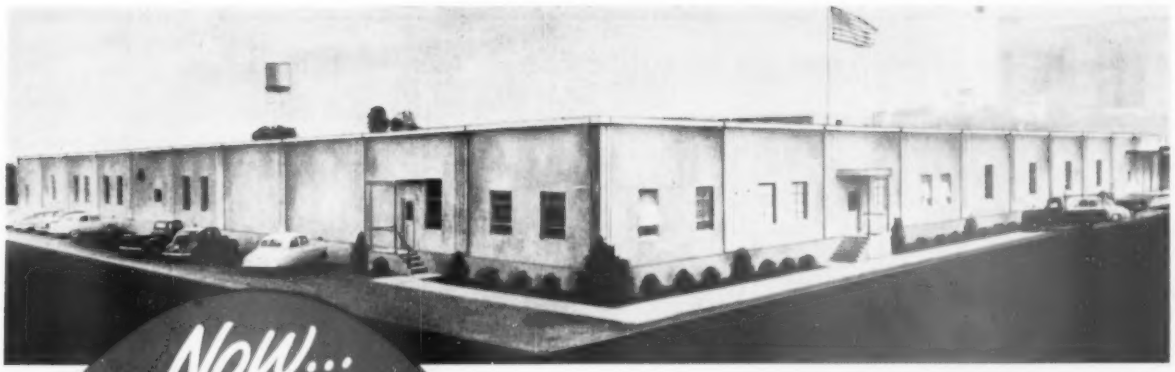

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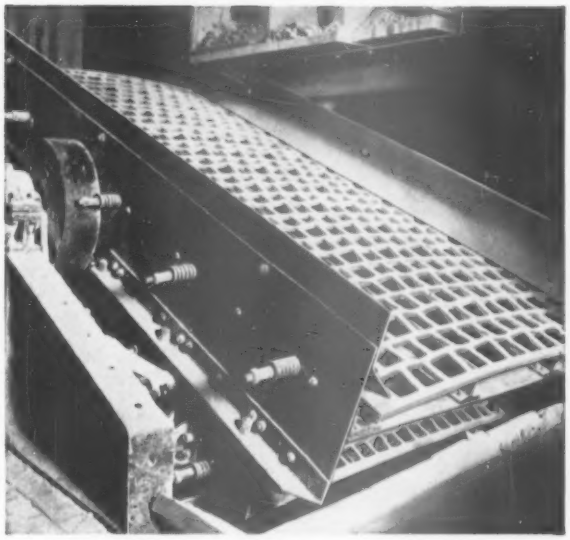

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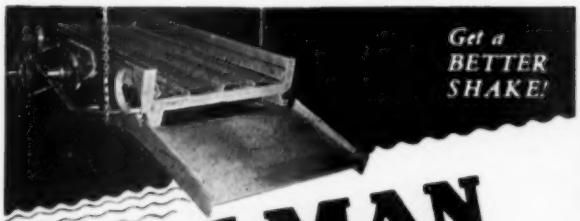

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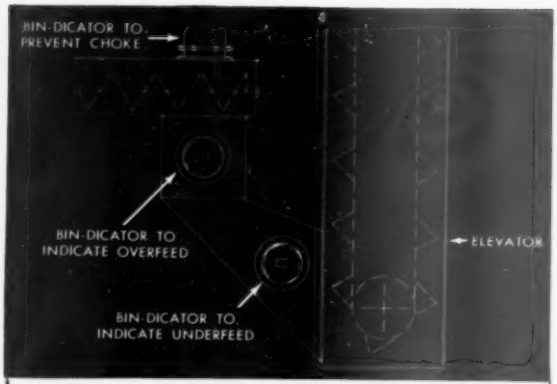

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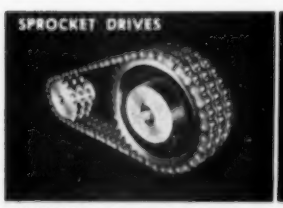
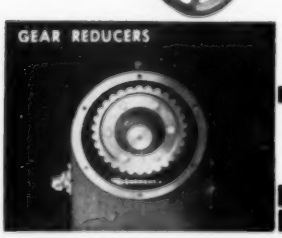


power transmission machinery



SINCE 1872 the J. B. Ehrsam and Sons Mfg. Co. has been making power transmission equipment for grain elevators, mills and the nonmetallic minerals industry.

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Call in an Ehrsam sales engineer when you have machinery problems.

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COVERS EVERY REQUIREMENT

. . . for a dependable, long-wearing, non-crystalizing Screen Cloth. Has "Nat-Aloy" Lock Crimp Meshes. Preferred for screening accuracy, economy and serviceability. All Sizes — All Meshes — All Gauges.

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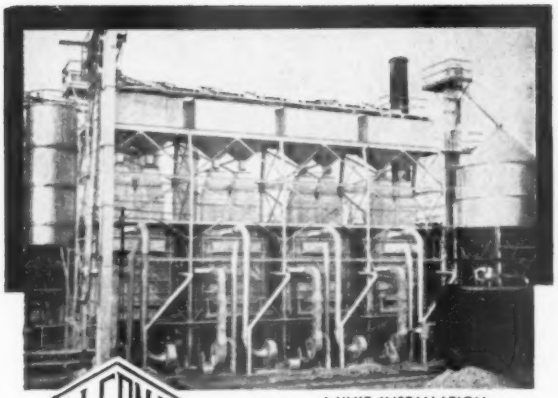
WON'T QUIT OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY 202-204 Fulton Street New York, N. Y.



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For Burning LIMESTONE, DOLOMITE, etc.

2 SIZES AVAILABLE

PREHEATS - CALCINES - COOLS

AUTOMATIC CONTINUOUS OPERATION

MINIMUM FUEL CONSUMPTION

There are extra dividends available in the operation of your plant when you use Ellernan Calciners . . . let us explain the exclusive features . . . write today for literature and detailed information applicable to your operation.

THE ELLERNAN CO.

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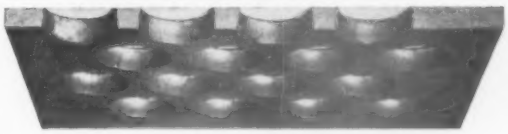
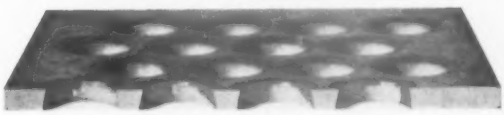
EFFICIENCY + with "CROSS" Screens

OUR METHOD OF

DIE PERFORATING



Under Side of Plate—Note absence of burr



Top Side of Plate—Note conical holes

ROUND SQUARE HEXCREEN

"CROSS" Perforated Steel Plates and Sections provide Greater Efficiency — Less Blinding — Greater Accuracy — and Longer Screen Life

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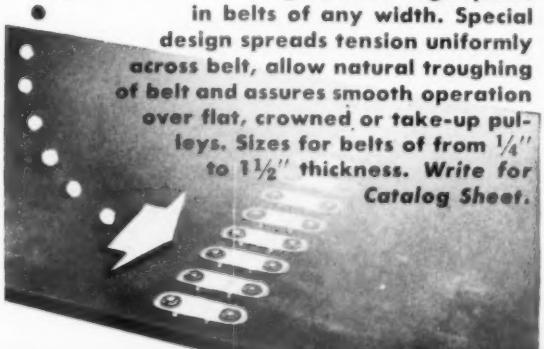
PLATE FASTENERS FOR CONVEYOR BELTS

Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. *Write for Catalog Sheet.*



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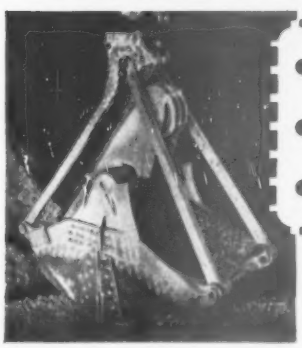
DESIGNED FOR HANDLING



- CEMENT CLINKER
- LIMESTONE
- GYPSUM ROCK

For complete information, construction details and specifications . . .

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BLAW-KNOX Buckets are built especially for low-cost handling of bulk materials in cement plants. Tight fitting lips of cast chrome-nickel-molybdenum alloy steel prevent leakage and resist abrasion to insure long dependable service. Available in a wide selection of capacities and weights to get the most from your crane.

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BLAW-KNOX CLAMSHELL BUCKETS FOR CEMENT PLANTS

SIMPLICITY
WOVEN WIRE SCREENS

- ACCURATE
- DEPENDABLE
- AVAILABLE

Simplicity maintains big stocks of aggregate wire screens, already woven, in an adequate range of openings and a choice of wire gauges . . . edges formed promptly for any type vibrator. Excellent service.

Write for Bulletin No. 66

Simplicity
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ENGINEERING COMPANY • DURAND, MICHIGAN

THE PENN-DIXIE KILN at Kingsport, Tenn. DESIGNED AND BUILT BY SMIDTH is the largest Rotary Kiln in the Western Hemisphere

MORE CEMENT — *Lower Cost*

A Cambridge Multi-Point Gas Analyzer provides the Burner with the information necessary to enable him to maintain optimum operating conditions in this gigantic kiln. The O_2 analysis is the primary indication of combustion conditions and the combustible analysis warns of fuel waste.

Three-point Model of O_2, CO_2 and Combustibles also available. The CO_2 analysis reflects state of the calcining process.

Single and Multi-point Instrument available for a wide variety of applications

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FREE SERVICE for Buyers

Here is the quick way to get information and prices on machinery and equipment. Just check the item (or items) listed below about which you desire information. Then send this list to us, and we will take care of the rest.

TEAR OFF HERE

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- ___Asphalt Mixing Plants
- ___Bagging Machines
- ___Bags
- ___Barges
- ___Batchers
- ___Belting, Conveyor, Elevator, Power Transmission
- ___Belting, V-Type
- ___Belt Repair Equipment
- ___Bin Level Indicators
- ___Bins and Batching Equipment
- ___Blasting Supplies
- ___Block Machines Concrete Building
- ___Bodies, Trailer
- ___Brick Machines and Molds
- ___Buckets
- ___Bulldozers
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- ___Classifiers
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- ___Concentrating Tables
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- ___Concrete Mixing Plants
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- ___Dragline Cableway Excavators
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- ___Dredge Pumps
- ___Drilling Accessories
- ___Drills
- ___Dryers
- ___Dust Collecting Equipment & Supplies
- ___Electric Motors
- ___Engineering Service, Consulting and Designing
- ___Explosives & Dynamite
- ___Fans & Blowers
- ___Flotation Equipment
- ___Front End Loaders
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If equipment you are in market for is not listed above, write it in the space below.

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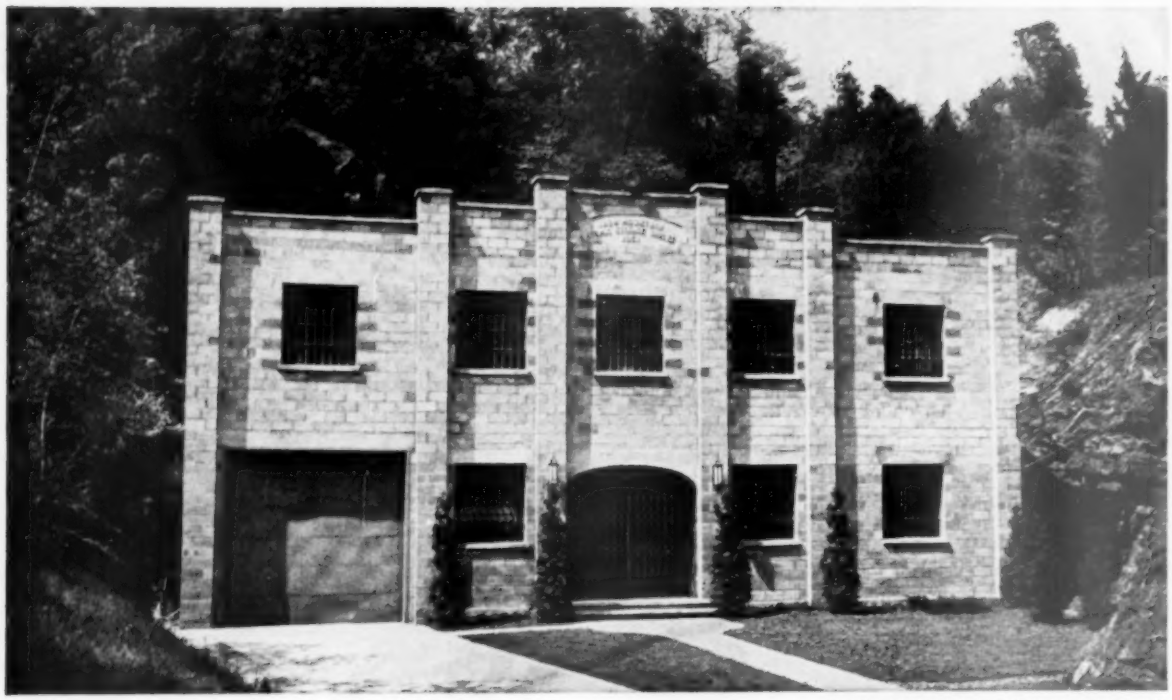
CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE



Iron Mountain Atomic Storage Vaults, Germantown, N.Y.
Contractor: Herman Knaust, Germantown, N.Y.
Block by: Hudson River Block Company, Ravena, N.Y.

250,000 DURAPLASTIC*-MADE BLOCKS on guard at "SAFEST VAULT IN THE WORLD"

Tunneled deep into the heart of New York's Iron Mountain, this storage vault is designed to protect the vital records of many firms against atomic attack. 250,000 concrete blocks made with Atlas Duraplastic finish off the stronghold and give additional protection from moisture. Duraplastic-made products are known for their increased resistance to the passage of water.

Good appearance of Duraplastic-made blocks is another characteristic. Manufacturers report edges and corners are clean-cut and truer. Duraplastic cement makes a more cohesive and "rubbery" mix that holds together better...feeds easily through machines. Moreover, plants using Duraplastic report reduction in breakage of green products, fewer culls and throwbacks.

YET DURAPLASTIC COSTS NO MORE

It sells at the same price as regular cement and requires no unusual changes in procedure. Complies with ASTM and Federal Specifications. For descriptive booklet, write Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Ave., New York 17, N. Y.

GOOD APPEARANCE of concrete blocks made with Atlas Duraplastic is emphasized by this photo of individual vaults. Duraplastic is also preferred for machine-made concrete pipe, brick, drain tile, silo staves, and other concrete products.

OFFICES: *Albany, Birmingham, Boston, Chicago, Dayton, Kansas City, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Waco.*

**"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company*

CP-D-144

ATLAS® **DURAPLASTIC**
AIR-ENTRAINING PORTLAND CEMENT

A UNIVERSAL ATLAS PRODUCT

Makes Superior Concrete Products at No Extra Cost

"THE THEATRE GUILD ON THE AIR"—*Sponsored by U. S. Steel Subsidiaries—Sunday Evenings—NBC Network*

INDUSTRY NEWS

Interlocking Block

INTERLOCK BLOCK CO., Erie, Penn., recently announced the development of a mortarless, interlocking block which adapts the mortise and tenon

Interlocking block are laid dry and sprayed with a sealer

principles to molded concrete building units. Greater economies in labor and materials are claimed for the new block. No special skills are required to lay them and 30 to 40 percent less mortar cement and sand are required for the finished building, according to the company. The block are laid dry up to heights of seven or eight feet, after which a sealer consisting of mortar cement and masonry sand is sprayed or brushed on the inside and outside of the walls. The walls may be waterproofed by incorporating a waterproofing compound into the mix.

Lightweight Concrete

VAN HOVEN CO., Chemicals Div., St. Paul, Minn., has developed a new product called Cemtein, which the manufacturer says will permit the production of lightweight concrete having an air content of more than 25 percent without excessive loss of strength. A protein compound to be added during concrete mixing, Cemtein activates the ingredients in such a manner as to create and evenly distribute millions of tiny air bubbles throughout the mass.

Concrete Study Course

PORTLAND CEMENT ASSOCIATION, in cooperation with Pennsylvania State College, is conducting a course at the college on the uses of concrete and concrete products. The classes are designed for builders, general contractors, their employes and other interested persons. Subjects include latest developments in concrete construction; approved practices in producing, transporting, placing, manipulating and curing concrete; cold and hot weather concrete; precast and prestressed concrete; economical uses of equipment; estimating; business and legal sides of contracting; promotion; and labor relations. Instructors and lecturers for the course include local industrial and business men as well as visiting experts in the field of concrete technology.

Precast Slabs

THE FLEXICORE CO., INC., Dayton, Ohio, recently completed negotiations with I. A. Marquez, Quezon City, Philippine Islands, for an exclusive franchise to manufacture and market Flexicore precast concrete roof and floor slabs in the Philippines. A company has been formed to produce the precast slabs and a new plant is being built at a cost of approximately $150,000.

This is the second franchise The Flexicore Co. has granted outside the United States this year. The slabs were introduced into Canada in April, 1952, when Murray Associates, Ltd., Richvale, Ont., began production.

Cover Picture

EUROPEAN PRODUCERS of concrete products have made more notable advances, particularly in the direction of specialties. The cover illustration shows the installation of Siporex lightweight concrete siding. This product is made with finely ground siliceous sand to which is added the correct amount of portland cement with water supplied to form a fluid mass. Powdered aluminum is added and the combined product is poured into steel forms where the powder reacts with the lime water to generate gases which gives the required porosity. Final curing is done in an autoclave.

Pipe Plant

GRAY CONCRETE PIPE CO., Hagerstown, Md., is reportedly building a large capacity pipe manufacturing plant. Pipe will be manufactured in a two-story structure measuring 126 x 130 ft.

Ready Mix Plant

BLANKENSHIP READY-MIX CONCRETE CO., McGehee, Ark., has started operations. In addition to facilities to handle, weigh and mix the concrete, the company has three truck mixers of 3-cu. yd. capacity each. The company will also sell sand and gravel and plans to manufacture block and drain tile in the near future.

DRY MIX CRETE AND SUPPLY CO., Grand Rapids, Mich., has started production of "Redi-Mix Crete," for use by home-owners for small or "patch-up" jobs where only a small amount of concrete mix is needed. It is packaged in 50- and 100-lb. bags and is available in three grades: gravel, finishing sand and mortar sand. The company also produces concrete block and other building materials.

TOBIAS & WRIGHT has established a ready-mixed concrete plant near Lyons, Kan. Equipment includes a 40-ton Winslow Binanbatch with a 42-cu. ft. weigh hopper and two 3½-cu. yd. Challenge truck mixers. The company is owned by Ansel W. Tobias, Walter Wright and Donald L. Birchenough who also operate a sand and gravel business.

CONTROLLING INTEREST of Schell Industries, Ltd., Woodstock, Ont., producer of concrete block, brick and ready-mixed concrete, has been acquired by R. G. Thomson, Woodstock. Mr. Thomson is the new president and general manager. Norman C. Schell is remaining as chairman of the board.

PLATTE VALLEY CEMENT TILE MANUFACTURING CO. has increased production of block at its Scottsbluff, Neb., plant, by the addition of a Columbia Model No. 8 automatic block machine. The new equipment has increased plant capacity to over 4000 block per day. George and Wallace Lillie are the owners and operators.

HALE COUNTY CONCRETE CO. has been established at Plainview, Texas, by Olin Williams. Plant equipment includes the aggregates batching plant; three transit-mixer trucks; and an 821-bbl. cement silo. Sand and gravel are obtained from Texas Sand and Gravel Co., Amarillo, Texas.

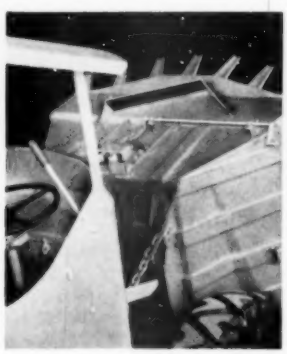
AMERICAN CONCRETE PIPE CO., Los Angeles, Calif., recently began operations at its new plant in Tacoma, Wash., for the production of large, reinforced concrete conduit. Daily production is about 18 lengths of 5-x 21-ft. pipe. Robert Twitchell is plant manager.

FRONTIER STONE PRODUCTS, INC., Lockport, N.Y., and Lousville Cement Co. of New York, Akron, N.Y., were recently awarded trophies for "extraordinary cooperation" during the annual safety contest sponsored by the State Insurance Fund.

GRAYS HARBOR CEMENT PRODUCTS Co. has begun operations of its new ready-mixed concrete plant at Aberdeen, Wash. Daily capacity is approximately 250 cu. yd. of concrete. Earl Bracken is president and plant manager.

A NEW READY-MIXED CONCRETE PLANT, to be known as Pueblo Pre-Mix Concrete Co., is being established at Pueblo, Colo., by a group of Denver, Colo., business men.

GRAVITY DUMP eliminates



SIMPLE BODY-RELEASE LEVER WORKS INSTANTANEOUSLY

1 Body release lever is located at steering wheel, no reaching or stretching. Lever engages trip rod on Dumptor body . . .

2 Trip rod instantly releases latch hooks from body latch seat on the Dumptor chassis frame. Gravity dumps the load . . .

3 Body rolls on heavy-duty rockers. Snub chains attached to big coil-spring shock-absorbers check body at 70-degree tilt.

KOEHRING HEAVY DUTY

body hoists

Koehring Dumptors have no slow-working body hoists. You trip the release lever and gravity dumps the 6-yard load in one second.

Cuts maintenance costs . . . there are no complicated mechanical hoists to slow up haul cycles . . . no expensive hoist replacement parts, maintenance or down time to eat into your profits. And gravity dump is always instantaneous, trouble-free in all temperature extremes . . . never wears out.

No spring maintenance is another money-saving advantage you get with Koehring Dumptors. There is just one big, double-coil chassis spring on steering axle . . . none on driving axle. Big shock-absorbing drive tires eliminate need for more springs . . . save spring maintenance time and replacement costs.

Check your body hoist and spring maintenance costs for a year . . . see how much you will save when you haul with heavy-duty Dumptors. In addition, Koehring constant-mesh transmission gives Dumptor the same 3-speed travel forward and reverse for "no-turn" shuttle hauling . . . increases production and your profits.

Get complete facts and figures from your Koehring distributor . . . or write to us for informative 28-page Dumptor® catalog.

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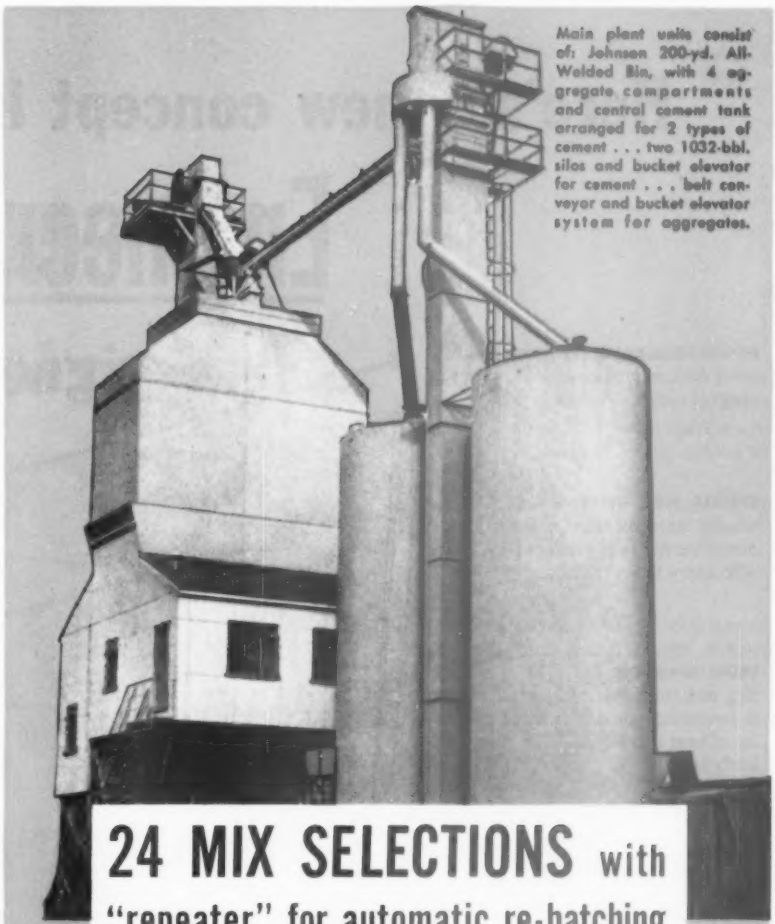
CK234



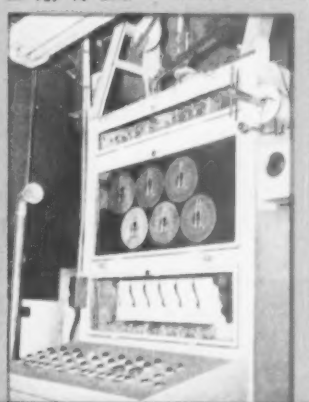
Main plant units consist of: Johnson 200-yd. All-Welded Bin, with 4 aggregate compartments and central cement tank arranged for 2 types of cement . . . two 1032-bbl. silos and bucket elevator for cement . . . belt conveyor and bucket elevator system for aggregates.

24 MIX SELECTIONS with "repeater" for automatic re-batching

Fully automatic and completely flexible, this Johnson Transit-Mix Plant produces 24 different size and type batches of aggregates and cement for a commercial ready-mix company at Covington, Ky.

Dial on a 24-mix-selector panel (below) provides for 2500-lb., or 3000-lb.-per-sq.-in. concrete in ½, ¾ and 1-yard batches. On each size batch there are 4 individual selections for 3, 4, 5 or 6-in. slumps. This makes it easy to change from one type of batch to another as needed. A "repeater" provides for continued automatic batching of any one selection for a pre-determined number of times. Operator sets the mix selector, sets the "repeater", pushes the "start" button . . . and the plant weighs out batches fast, accurately.

Plant is equipped with a 2500-lb. sand batcher . . . three 2500-lb. batchers for fine, medium and coarse aggregates . . . a 2000-lb. water weigh batcher . . . and a 2000-lb. cement batcher with dual fill valves for selecting 2 types of cement. All are fully automatic, and controlled by the Central Dial Scale Unit with pen recording of the weight of each single-material batch. Recorder shows "full" and "empty" weight of hopper, makes sure a complete batch is weighed out on each material. For all the facts see Johnson distributor . . . or write.



X9

C. S. JOHNSON CO. CHAMPAIGN, ILLINOIS
Koehring Subsidiary

Here's a new concept in light-weight

Engineered weight

designed to give you

PRECISION BUILT, two-compartment water tank assures accurate water measurement—even when mixer is not level.

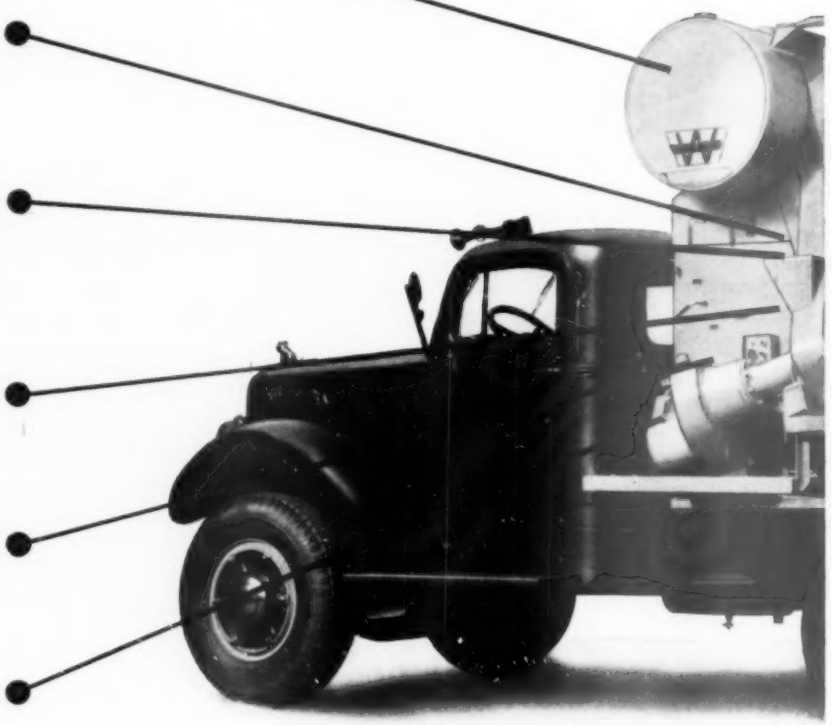
SPECIAL STEEL DRUM SPROCKET of unusually large diameter reduces torque, minimizes effects of starting and stopping with heavy loads.

DRUM SPROCKET SEAT, tire and drip ring end are machined *after* all welding is completed—thus eliminating possibility of heat distortion. Drum runs absolutely true.

WORTHINGTON-DESIGNED Timken-equipped trunnion bearing offers maximum flexibility.

HIGH CAPACITY, double V-belt-driven Worthington water pump, equipped with efficient disc-type clutch.

HEAVY-DUTY TRANSMISSION is designed and built by Worthington. Forward and reverse clutches and brake are completely enclosed and run in oil. Single lever operation.



The new Blue Brute Truck Mixers are the product of nearly a century of mixer building experience.

Weight distribution has been engineered so that the center of gravity is well forward of the rear axle—enabling you to carry the maximum legal payload.

Rigid field and factory tests assure you of trouble-free operation and easy maintenance—with all parts requiring maintenance readily accessible.

The modern Blue Brute is available in capacities of 3, 4½, and 5½ cubic yards, with respective agitator ratings of 4¼, 6⅛, and 7⅜ cubic yards.

Learn more about the new Blue Brute—the truck mixer that is the ideal combination of light weight, strength, and durability. Write your nearest Worthington Blue Brute distributor or Worthington Corporation, Construction Equipment Division, Plainfield, New Jersey.

truck mixers . . .

distribution—

maximum legal payloads

FAST CHARGING HOPPER is equipped with the simplest, easiest to operate control available—no chains, worms or sprockets.

AUTOMATICALLY WELDED, overlapping drum joints for greater strength at drum seams.

LIGHT-WEIGHT, STRONG, die-formed distributing chute is shaped to permit unobstructed flow of concrete.

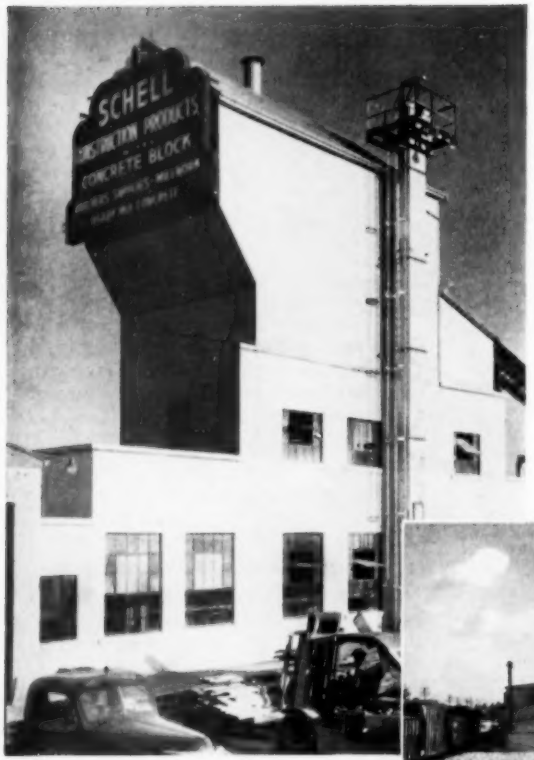
CHILLED-FACE DRUM ROLLERS are self-cleaning and thoroughly sealed against dirt. High-carbon, deep section drum tire is automatically welded to drum.

FULLY EQUIPPED, the 4½ cu yd closed end Blue Brute truck mixer weighs less than 6800 lbs. The open end mixer (same capacity) weighs less than 6200 lbs.

R.2.4

If It's A Construction Job, It's A *Blue Brute* Job

WORTHINGTON
Construction Equipment



YOU'LL MAKE A

Greater Profit

WITH A

BUTLER· designed

BLOCK PLANT

BUTLER has designed and built more modern concrete products plants than any other concern in the country.

Here are the reasons: BUTLER Engineers thoroughly understand your production requirements. BUTLER Engineers know how to simplify complex material handling problems. They take advantage of terrain and means of supply. Even climate enters their planning.

BUTLER Engineers attain an economical production flow with a minimum of manpower. They analyze your market, its potentials for growth and plan your plant accordingly.

But more, BUTLER Engineers give you the economy of standard manufacturing and fabrication — but applied in new and ingenious ways to your individual problem.

So as the very first step in planning your plant — *send for a BUTLER Engineer.*

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

LOOK JOE!...in SECONDS

A... Clipper MASONRY SAW ... WILL CUT THE HARDEST BRICK–STONE–TILE!*

*and at the lowest cost per cut

AND A... Clipper "SAILS RIGHT THRU" MASONRY SAW

... will PAY FOR ITSELF from the SAVINGS in TIME and MATERIAL

HERE'S WHY!...The DUSTLESS Clipper operates right beside your bricklayers because the Clipper is PORTABLE ... easily moved from basement to roof. One Clipper Model HD with a Clipper Diamond Blade will do the cutting of 3 ordinary abrasive saws! This is possible *ONLY* with such Patented Clipper features as...the Pressure Equalizer Spring, the Famous Select-A-Notch, Water Application System, and Adjust-A-Cut which makes possible One-Spot Operation.

Only with These Patented Clipper Features is Masonry Cutting Economical ...

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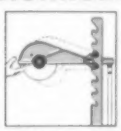

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... guaranteed to "Consistently Provide the fastest cut...at the lowest cost...with the greatest ease!" Clipper alone can supply *all* specifications of Abrasive, Diamond and "CBR" (Break-Resistant) Blades to accurately meet your requirements. INVEST IN CLIPPER and YOU'LL GET RESULTS!

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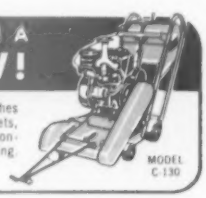

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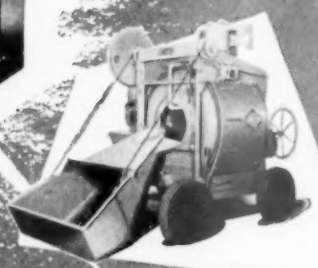

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When you think of concrete mixers you naturally think of SMITH. The name SMITH is held in high esteem throughout the construction industry, because SMITH has always produced the finest and most dependable concrete mixers that money can buy. Every SMITH Mixer is backed by more than 52 years of specialized engineering and manufacturing experience. And every machine is thoroughly job-tested. The familiar SMITH trademark, found on every SMITH Mixer, is therefore a symbol of quality and dependability. The next time you need stationary mixers, truck mixers or agitators, remember you can buy SMITH Mixers with confidence.

The T. L. SMITH COMPANY, 2885 N. 32nd St., Milwaukee 45, Wis., U. S. A.

Affiliated with ESSICK MANUFACTURING CO., Los Angeles, Calif.

For BIGGER and BETTER Concrete Mixers . . . Look to SMITH!

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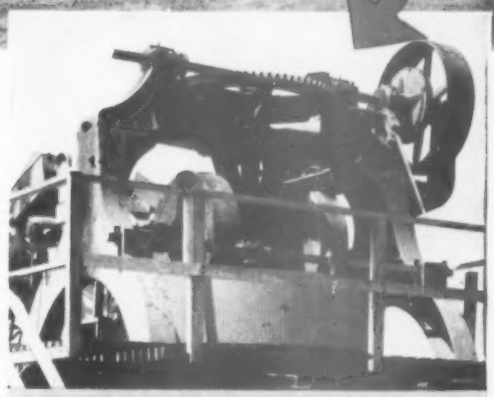
Do You Need Big Volume, Low Cost GRINDING?

"AMERICAN" No. 9 Grinder at work for Columbia Concrete Products Co., Toledo, Ohio.



Here's what this "American" No. 9 Grinder will do for YOU...

- Easily deliver up to 30 yards per hour
- Grind wet or dry
- Prepare accurately-sized aggregate from such materials as

CINDERS	**HAYDITE**
SLAG	**PUMICE**

- Require practically no maintenance
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Complete "American" Grinder specifications sent on request . . . and the experience of an "American" grinding specialist is available to you without obligation. Write, wire or phone.

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By W. A. RIDDELL CORP., Bucyrus, Ohio

Typical "American"—planned installations successfully delivering daily plant requirements at a profit . . .

CONNECTICUT
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Mansfield • *Cement Products Company*
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SEE IT JANUARY 26th

Don't miss the Concrete Industries Exposition in Cleveland starting January 26th. The big news there will be in the Rex booth . . . a great new development you simply can't afford to miss.

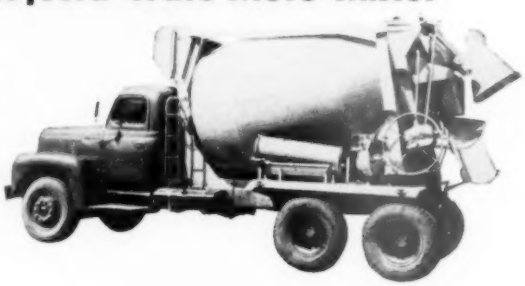
We can't tell you about it yet—see it at the show. But we *can* tell you that it fills a long-standing need in the Ready-Mix industry . . . that it's something of vital interest to every Ready-Mix operator in the United States . . . that it will more than pay you to be one of the first to take advantage of this great development.

don't miss

AND...YOU'LL ALSO SEE...

...the sensational Rex Adjusta-Wate Moto-Mixer

. . . introduced at last year's Ready-Mix Show . . . now proved with outstandingly successful field experience from coast to coast. With the Adjusta-Wate you put more weight on the front axle . . . carry greater legal payloads with best possible weight distribution. You have complete flexibility in mounting . . . complete flexibility in choosing a truck. And you have 16 options to choose from to give you a machine that exactly fits your operating needs.



CHAIN BELT REX COMPANY ®

Remember—it's the Rex Booth, Concrete Industries Exposition, Cleveland, Ohio, Jan. 26th through 29th

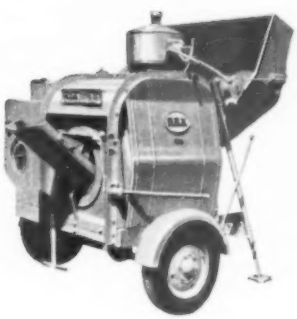
it!

REX

The Trade Mark of Quality

also brings you the best in

- **Building Mixers**
- **Plaster and Mortar Mixers**
- **Self-priming Centrifugal Pumps**



The Rex line of construction machinery includes a complete line of building mixers, ranging in size from 3½S to 28S; the finest in plaster and mortar mixers; and a complete line of self-priming centrifugal pumps, ranging in size from 4M to 90M g.p.h.

See you at the show! For details on any Rex Moto-Mixer, talk to us there, see your nearest Rex Distributor, or write to Chain Belt Company, 4649 W. Greenfield Ave., Milwaukee 1, Wis.

CONSTRUCTION MACHINERY

ANNOUNCING A TOTALLY NEW ACHIEVEMENT IN

NEW BUILT-IN BEAUTY for INTERIOR WALLS

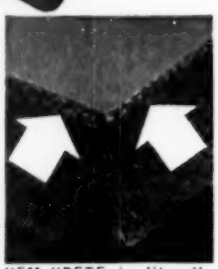
Provides WALL and FINISH in one unit

Withstands cleaning compounds...chemicals ... heat and cold ... impact shocks

Glazed and textured finishes— 20 beautiful colors

with SHERWIN-WILLIAMS KEM-KRETE

Adhesion of KEM-KRETE (used as a joint in this lab test) is stronger than cohesion of the concrete itself.



KEM-KRETE is literally "locked-to-the-block"—penetrates deep into pores before copolymerizing action converts it into a solid.

Now, for the first time, a new research development of Sherwin-Williams Laboratories makes possible a totally new construction material that opens up new possibilities—new savings—in all types of interior masonry construction.

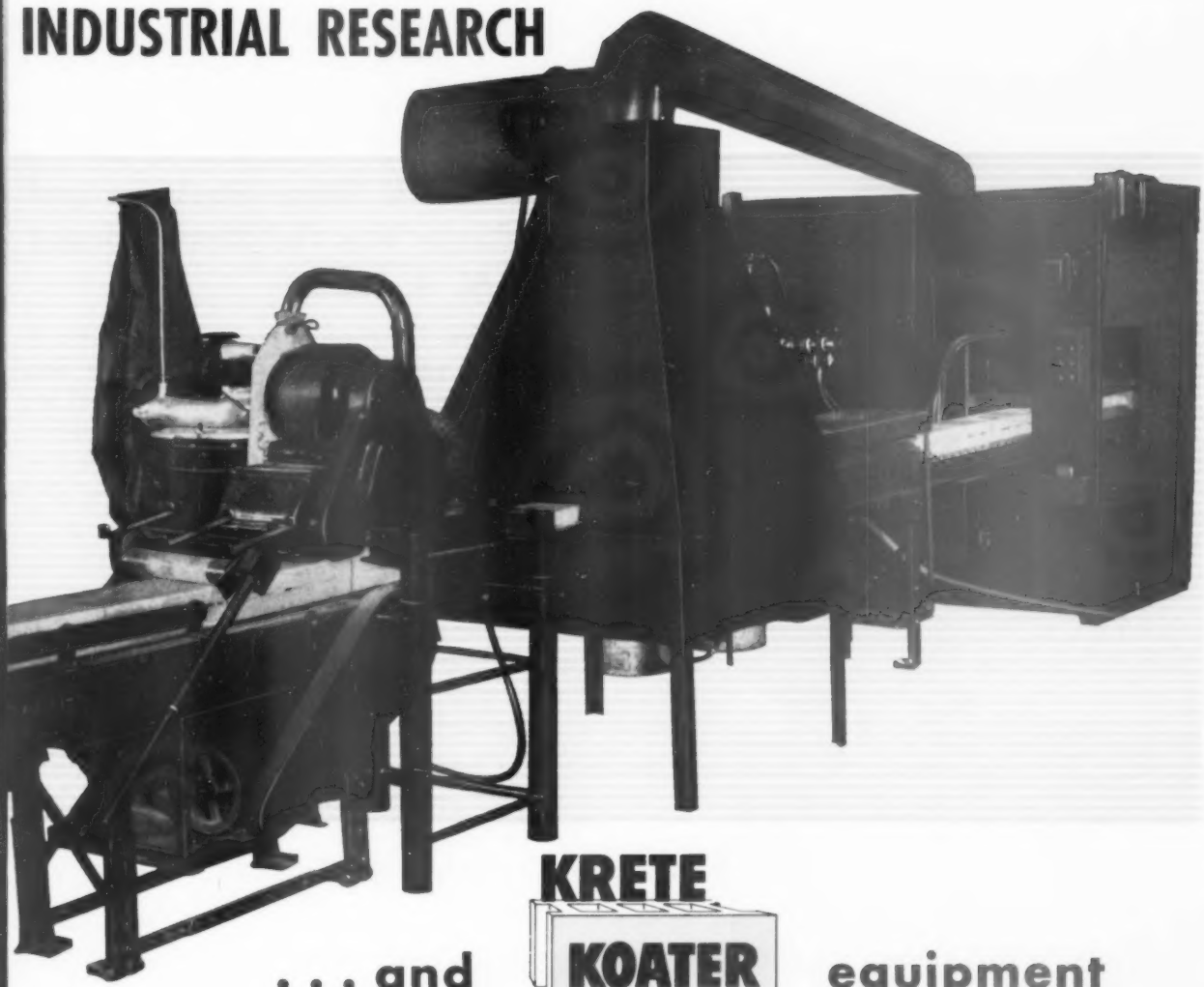
• Sherwin-Williams KEM-KRETE—a totally new, chemically evolved facing for application to standard concrete masonry units during manufacture—provides new, lasting, built-in beauty—eliminates need for costly, special facing or finishing operations after erection.

KEM-KRETE is unlike any previously existing material. Applied by a specially developed process, it becomes an integral part of the block—produces a tough, resilient, craze-proof, chip-proof, resistant, water-proof surface that withstands cleaning solutions, chemicals, temperature extremes and impact shocks. Supplied in 20 colors and in either glazed or textured finish, color-styled for interiors of homes, schools and commercial and industrial buildings of all kinds. See it at booths 130-131 at the N.C.M.A. Convention at Cleveland, or write for literature.

THE SHERWIN-WILLIAMS CO. • CLEVELAND 1, OHIO
GENERAL INDUSTRIAL DIVISION

SHERWIN-WILLIAMS

INDUSTRIAL RESEARCH



. . . and KRETE KOATER equipment

KRETE-KOATER equipment opens the way to new and expanded markets for block manufacturers—new profits from present business—new and highly important advantages over competition!

KRETE-KOATER equipment is a patented co-development of Sherwin-Williams Research Laboratories, especially designed for glazing concrete block with Sherwin-Williams KEM-KRETE materials. It provides a complete, simple, efficient, packaged unit which is low in cost and easily added or adapted to most existing operations, even of modest size.

No baking operations or special curing kilns are required—no special equipment for varying sizes. Standard equipment handles standard units from 1⅝″ to 12″ heights, including bullnose and special shapes. Continuous processing produces finished blocks at high production rates.

Investigate the new profit opportunities that KEM-KRETE and KRETE-KOATER equipment offers you—see it at the N.C.M.A. Convention, or write for details.

THE KRETE-KOATER SERVICE COMPANY
HILLSBORO, ILLINOIS

New opportunities . . . new profits . . . for block manufacturers

Low-cost equipment opens new markets . . . new volume business

Simple . . . efficient . . . easily added to existing operations

INDUSTRIAL PRODUCTS

Another Leader★ IN THE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!

Messers. M. A. Moss, President, and H. O. Pommer, Vice President of John A. Denie's Sons Co., Memphis, Tenn.

Mr. F. C. Ladd, Executive Vice President of the Company, and State Senator from Memphis.

"We Checked All Other Machines and Decided Besser was the Most Efficient of All"... M. A. Moss

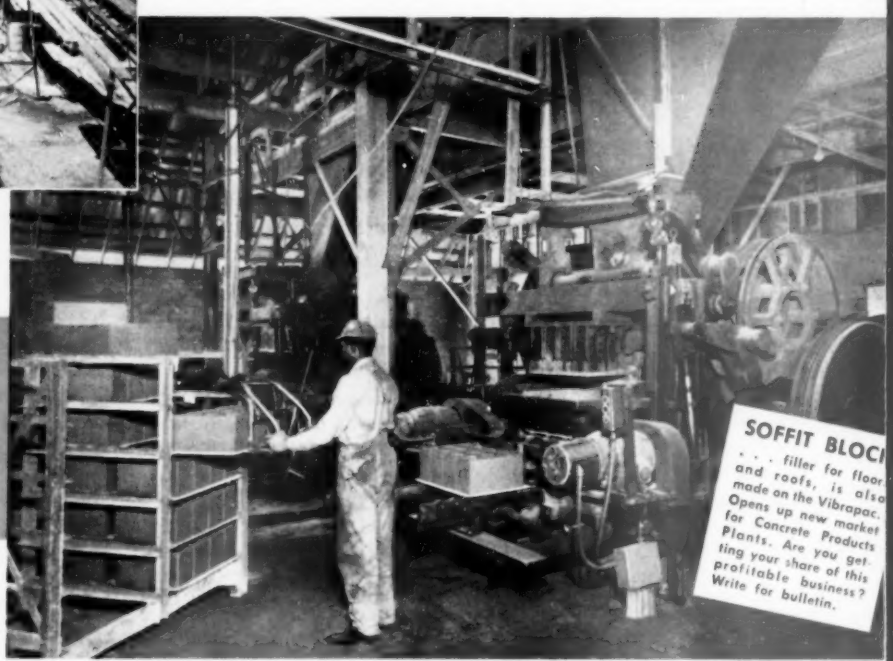
John A. Denie's Sons Company, Memphis, Tenn., is one of the oldest building material dealers in the south. The firm established its clay brick plant about 97 years ago and has been manufacturing brick ever since. They use the rather catchy slogan "We Sold Your Great Grandfather".

In 1945, the Denie's Sons Company installed their first Besser Super Vibrapac machine. This was followed by another Super Vibrapac in 1948. These two machines are used for producing both sand and gravel block and lightweight units sold in conjunction with their face brick. That officials of the company were very careful in selecting the right type of equipment is reflected in Mr. M. A. Moss' statement shown above.

Here is another example of a progressive clay brick plant which has found the combination of brick and block a profitable investment.

BESSER MANUFACTURING COMPANY
ALPENA, MICHIGAN, U.S.A.

Exterior view of the John A. Denie's Sons Co. plant showing modern material handling equipment.



One of the Besser Super Vibrapacs installed in the Denie's plant. Note four 5⅝ x 7⅝ x 15⅝ partition block produced on one Plain Pallet. Other sizes produced in equivalent multiples on the same Plain Pallets. The machine is fully automatic. Hand labor is reduced to pushing a switch button and guiding a power off-bearing hoist.

SOFFIT BLOCK ... filler for floors and roofs, is also made on the Vibrapac. Opens up new market for Concrete Products Plants. Are you getting your share of this profitable business? Write for bulletin.

★ This is the 96th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapac machines.

BESSER

BATCH MIXERS | SKIP LOADERS | BLOCK & BRICK CUBERS | SUPER VIBRAPAC | SINTERING PLANTS | ACROW CENTERS | ROOF TILE MACHINE

EUROPE LEADS IN PRODUCT DEVELOPMENT

Widespread use of light weight concrete in homes, apartments and industrial buildings, large prestressed structural members, and such unusual specialties as precast balconies, telephone conduit pipe, and insulating concrete made with treated, shredded spruce aggregate

By GILBERT E. OLSON*

Gilbert E. Olson

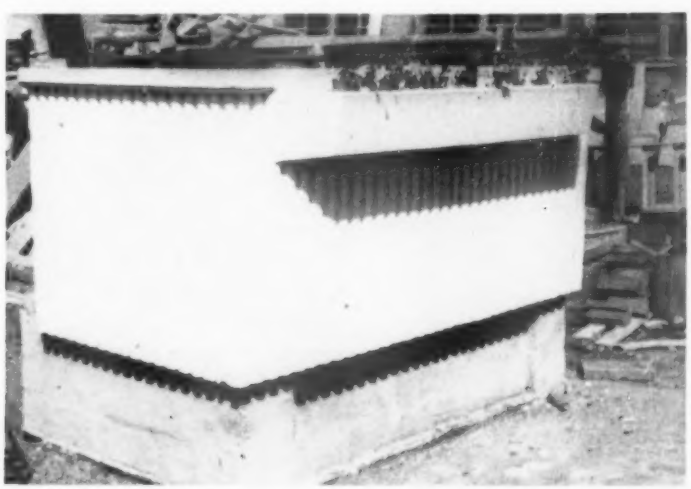
QUITE OFTEN WE LEARN about things being done here or there, and we often wish we could go and see for ourselves what is really going on. Motivated by rumors that Europe, since the war, was making real advances in concrete products, both in methods of manufacture and various uses, I decided to investigate and perhaps pick up an idea or two. Leaving New York on the *"Gripsholm,"* I arrived in Gothenberg, Sweden, after a very pleasant and enjoyable trip across the ocean.

Almost immediately I could see new and interesting concrete products used in many different ways. One of the first things noticed was the many varied types of patio stones or paving block made of concrete. Patio stones, often called "stepping stones," are being made in square, octagon, hexagon and oblong shapes in many different sizes. Often the stones were integrally colored and many styles had a design stamped into the face. A very interesting and unusual type had a face of rather round pebbles from ⅛ to ¼ in. dia. as a wearing surface. In manufacturing these stones, a heavy steel plate is used as a pallet, on which a sheet of waxed paper is placed. A ring of the desired size is laid on the pallet, and a light layer of dry gravel is poured on the pallet within the ring. A rather dry sand and cement mix is then placed over the gravel, and another steel plate laid on top of the cement-sand mix. The unit is placed under a hydraulic press and pressed down until the top pallet is flush with the top of the ring. The pallet is then turned over, the first pallet removed, the wax paper taken off and a wet whisk broom brushed over the pebbles, leaving a very neat pebbley surface of unusual strength and wearing surface. This block is used for patios, sidewalks, driveways, and entrance foyers.

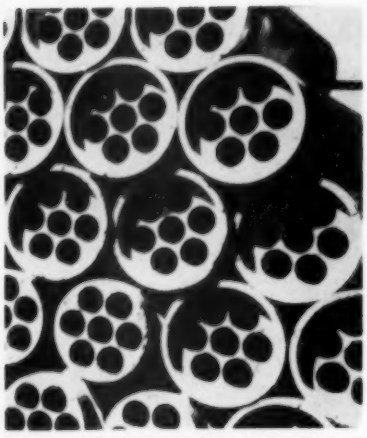
Block, Roof and Floor Slabs of Lightweight Concrete

Being especially interested in concrete block, I noticed that most of the new construction was using block. The block are made of a very lightweight, cellular concrete. Each block is 10 in. high, 20 in. long and from 6 in. to 12 in. thick, depending on the particular wall construction. The unusual light weight is noteworthy. The block are made in three different densities: namely, 31, 37 and 44 lb. per cu. ft. All the block are solid. This lightweight concrete material became even more intriguing when I discovered this same material cast in the form of insulating slabs for floors, roofs and certain types of walls and beams. This material can be cut with a saw or axe, can be nailed into, holes can be drilled in it with

Right: Example of concrete apartment house construction. Note concrete balconies Below: Precast concrete balcony with integral cast flower box



*Vice-president, Builders Supply Corp., Phoenix, Ariz.

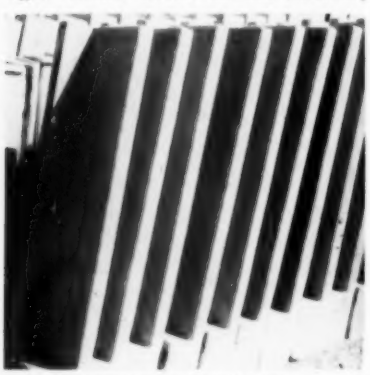


Concrete telephone conduit pipe made in 3 and 4 ft. sections

a brace and bit, yet it has unusual strength, very low absorption, exceptional insulating qualities, and very low shrinkage. Further investigation revealed many varied and interesting uses for this new and modern build-

Insulating concrete slabs made with shredded spruce as aggregate

ing material. Factory buildings built with this lightweight cellular block have the roofs covered with long reinforced slabs made of the same material. Apartment buildings, some built entirely of this block, have a light cement stucco on the exterior,



Precast concrete stair risers

and others use the block as back-up with a facing of clay brick. Huge aircraft hangars are constructed with roof slabs of reinforced, lightweight cellular concrete, providing a beautiful under-finish as well as structural strength and insulation. These roof slabs are made in 20 in. widths from 3 in. to 8 in. thick, and in lengths from 3 ft. to 19 ft. 6 in. long, with a weight factor of only 31 lb. per cu. ft.

A new type of low cost housing was being introduced with this material which employed the usual wall construction of block slabs for both the exterior and interior walls. The ceiling slabs were placed to reach from wall to wall, which provided at the same time a plaster base for the ceiling and insulation from the attic space. A conventional roof structure can then be built above, having any roof pitch desired. These standardized units are used for the entire frame of the house, floors, ceilings and walls, easily joined together, thus making it possible to erect quickly and efficiently a very economical house.

Further investigation brought me in contact with Bengt Lundgren, chief engineer for Siporex International at Stockholm, Sweden. Through the courtesy of Mr. Lundgren and some of his assistants, I was personally conducted through Siporex factories at Gaule, Sodertalys, Dally and Gothenberg, all in Sweden. A new and very modern plant was just being placed in operation in Shellextea, Sweden. The factories of Siporex are large, well-equipped, modern plants strategically located throughout Sweden with research directed from a very fine laboratory located at Sodertalys not far from Stockholm, Sweden.

Porous, Lightweight Concrete Made With Powdered Aluminum

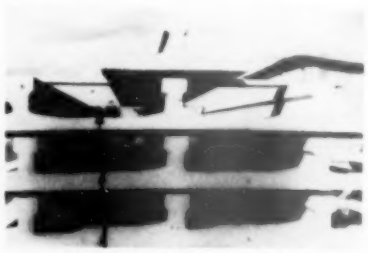
Siporex concrete is made of finely ground siliceous sand to which is added the correct amount of portland cement with water supplied to form a fluid mass. At the proper time, powdered aluminum is added and the combined fluid mass poured into steel forms, where the aluminum powder reacts with the lime water to generate gases and the materials sets to the required porosity. The set material is then placed in an autoclave for final curing and is then ready for delivery to the jobsite. Reinforced Siporex slabs have the steel rods or mesh placed in the forms in a fixed position and the mass sets around the reinforcing material with a very strong bond.

An interesting development of this modern concrete is the fact that although Sweden is a heavily forested nation with tremendous resources in timber, the building records reveal that now 68 percent of all the construction in Sweden uses masonry materials or concrete of one type or another. The many savings that may be effected through the use of lightweight concrete and concrete products are quickly recognized by the Swedish builders. They also recognize the low maintenance costs and durability of concrete. Siporex lightweight concrete plants are now being erected in Poland, Germany, France and South America, and I am sure very soon we will have similar plants in America.

Another product similar to Siporex is being manufactured in Sweden by Yxhults Forsaljnings A. B. Gjorwellsqatan 12, Stockholm, Sweden, under the trade name of Ytong. This company has four plants throughout Sweden. The Ytong process uses limestone and high-aluminum stone which is calcined, finely crushed and pulverized, and mixed with water and aluminum powder before placing in a fluid state in steel molds and finally autoclaved for the final set.

Prestressed Concrete Structural Members

One of the fastest growing industries in Scandinavia is the prestressed concrete industry. In Stockholm the Stranghetong Factory, Mejerivagen 4 is a very interesting plant to go through. Here, in a modern building, fully-equipped for the production of prestressed concrete, one can see the manufacture of huge concrete girders for wide spans; precast bridge sections; beams of all types and sizes; telephone poles, both regular and ornamental; precast, prestressed industrial building structural members with traveling crane rails and other requirements incorporated into the concrete as it is placed. The well-planned, soundly engineered sections and structural parts that go into the construction of a factory building, for example, are so detailed and carefully cast that the various parts practically fall into place. They do with prestressed concrete practically everything in construction that we do with steel. Through the courtesy of Disponent Henning Collberg, I saw the various processes used and many of the finished products. They have published a very fine catalog and engineering booklet that describes many of their popular products. With the many shortages of structural steel in the Scandinavian countries, the use of prestressed concrete has moved years ahead of most of the world in this field.



Concrete roof and floor joists

Perhaps one of the most interesting concrete products plants in all of Europe is located in Malmo, Sweden. Here the Skanska Cement Co. has a huge concrete products plant, making everything from block to beautiful cast statues. Various types of precast and prefinished stairways are made. Some stairways are cast with hollow stair risers with reinforced stringers. Others are cast as unit steps and assembled on the job—straight stairs, curved stairs, stairs with landings—in fact, every kind or type of stair a job might require can be found in the storage yards or casting rooms. Many of the stairs have non-slip materials cast in the nose of the tread. Others are finished in colors, plain or with terrazo.

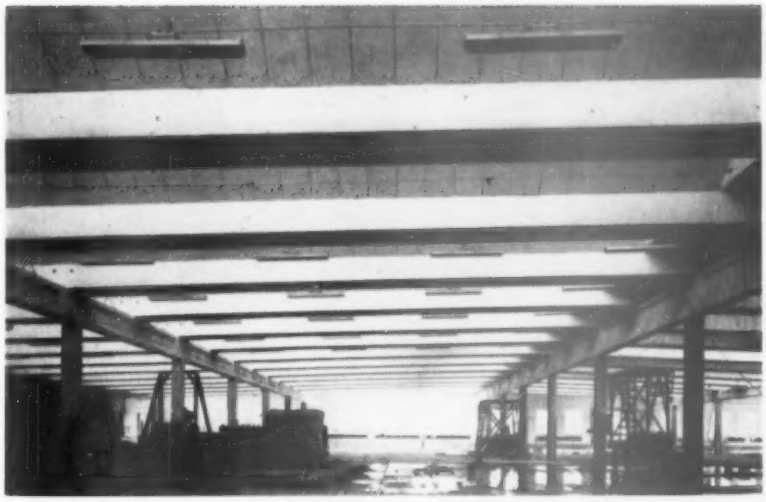
Concrete Specialties

Precast balconies, which are popular in all the Scandinavian countries in homes and particularly in the apartment houses, are a specialty with this firm. Some of the concrete balconies have built-in flower boxes. Beautiful pierced concrete designs are available as well as ornamental fluted balcony rails. The balconies are cast in one piece with anchors provided so that the balcony may be lifted to the respective position and set quickly in place.

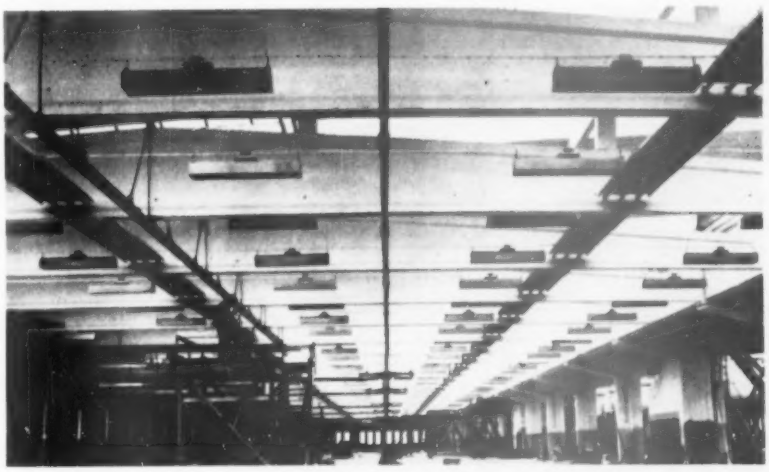
Precision concrete telephone conduit pipes in 3- and 4-ft. sections are cast with as many as 20 perfectly smooth, matched 3-in. round holes running through each section of conduit. This type of conduit pipe is made of a very fine dense concrete in very accurate precision molds.

An unusual cast concrete novelty was a piece of concrete designed for children to use on public playgrounds. The unit, approximately 6 ft. high and 8 ft. long, looked like a large rock with three 14-in. dia. holes arranged to allow the children to crawl through the holes or climb up on the top of the "rock" and slide on their stomachs down to the bottom over smooth rounded surfaces. The plane of the stone was curved and hollowed so that the youngsters could squirm around and through the rock without any injury of any kind. Truly a novel playground piece with many practical and healthful innovations, yet cast in concrete.

A new and exciting concrete product that is moving fast throughout Europe, as fast as licensees can be set up, is a precast concrete highway guard rail. This product, placed along the highway at curves or other dangerous places, is so designed that the curvature of the concrete guard rail will deflect a car and cause wheels of a vehicle bumping or striking it to be turned parallel to the guard rail and follow it to the end of the guard rail. The guard rail, made of reinforced concrete, is designed in the shape of an ear in cross section. The individual sections are approximately 10 ft. long and fitted with malleable, cast-in-place sockets to receive the



Factory building constructed with lightweight concrete roof slabs and prestressed concrete beams



Prestressed concrete framing. Note wide spans and cantilevered pillar supports for beams

Lightweight concrete slabs in walls and roof

Precast concrete highway guard rail is ear-shaped in cross section. Sections are 10 ft. long

heads of the attaching bolts. A cast concrete post is used as a support for the guard rail, and is designed to receive or allow the guard rails to butt against each other for secure fastenings. Tests have proved this guard rail to be the most effective, durable and safest of all the different methods used for the protection of hazardous highway spots.

Concrete Insulating Board from Wood Shavings and Cement

Most of the larger concrete products plants in Sweden and Norway manufacture an insulating board made of spruce shavings and cement. The insulating boards are made in various thicknesses from 1 in. to 8 in. thick, usually about 20 in. wide and in lengths from 3 ft. to 12 ft. The process is very simple. Most manufacturers use shredded spruce. The shreds vary from the size of common excelsior to flat ribbons, ¼ x $\frac{1}{32}$ in. in section. The shredded spruce is soaked in a solution of calcium chloride to "kill" the growth, then dipped in a vat of portland cement slurry, placed in wooden forms of the desired size and thickness and pressed together by placing a cover over the form and applying pressure to hold the cover down until the cement sets. Sometimes they simply stack one form on top of the other until finally the last form receives a placement of heavy weights or a jack is applied against an upright frame to press the forms together until the cement has set. This insulating board has many uses. It can be made very carefully so as to have nice sharp corners and uniform placement of the shredded spruce, thus the board becomes decorative as well as insulating. It is often used as a barrier between various types of wall and roof construction. It is used as a wallboard and stuccoed directly. It is used as an acoustical board. I even saw houses and barns built with this board that had no protective coating on the surface other than the inherent protection and weathering of the cement and shredded spruce as cemented together.

Even the saw dust, a waste product around any saw mill, is used in Scandinavia in many ways. Plain sawdust is treated with a chemical, then mixed with a small amount of coarse sand and cement and poured as floors in homes and apartment houses. The concrete thus produced was light, it was easy to work and handle and apparently did not crack. Sawdust concrete provided, however, many valuable features in construction. This type of concrete was resilient when walked on. It gave the floors an excellent sound deadener which could be especially noticed on multistoried apartment houses. As an insulating floor it provided an economical and permanent insulation material whether used as a clear span floor or direct on the ground. For increased wearing surface, any asphalt or rubber floor tile could be laid on top of the sawdust concrete floor. Carpeting this type of floor was no problem, because nails can be driven into it like wood.

In the field of concrete products, it seems the Scandinavian manufacturers have branched out into many exciting fields, some of which have been talked about and others that offer many challenges. Every community seems to present at one time or another a new problem to the concrete products manufacturer, but they do something about it. Other items I noticed include: concrete fence posts; concrete cattle feed troughs and watering troughs; prestressed, light concrete railroad ties of unusual and clever design; concrete high tension power line towers and carriers; concrete lawn or beach umbrella holders; concrete slabs to fit between tracks for all types of grade crossings and approaches; concrete road signs and direction plaques; concrete eave troughs and gutters to carry the rain from factory buildings; concrete bomb shelters of several types and styles; concrete slabs with slots to hold bicycles when parked; precast concrete mushroom type shelters placed at waiting places for buses or trains; concrete roof tile of many styles and types; ornamental concrete plaques and stones used to decorate buildings around doors, windows, cornices or decorative belts. There were many other applications too numerous to mention.

Danish Developments

In Copenhagen, Denmark a very interesting type of construction was being used in the building of a group of apartment houses. Engineers and architects from Sweden, Germany, France and South America have visited this project because of its unique and economical construction.

Using a bloated, fired-shale lightweight aggregate, the walls of the building are precast units approximately 10 in. thick and 3 x 4 ft. in surface area. The face of these units has been cast with grooves to give

(Continued on page 260)

Concrete fence posts and umbrella holders

4. Organize ready mixed concrete operations to cut costs and improve service . . . .

OPERATION FUNDAMENTALS

By J. A. NICHOLSON

SOMEONE IN EVERY READY-MIXED concrete organization should be given the job of constantly seeking opportunities of cutting costs, producing a better concrete and improving service.

Each year since the late 30's, the average hourly rates paid to transit mixer drivers, plant men and crane operators have advanced over those of the previous period. Each year, plant and delivery costs have gone up. Each year, the average sizes, (national figures), of transit mixers, used in operations, have been reported "just a little larger." The problem of increased costs has been partially met with the answer of bigger payloads. No one should be led to believe that our ever-ready answer of "bigger payloads" will be a permanent deterrent to mounting costs. The enforcement of load limit laws will put a stop to that pattern.

Expensive, specially-built equipment is used, but we sell a low cost product. We are limited to small legal payloads. Most of us pay high labor rates. Many of us annually experience costly slack periods. Some of us have had our profit picture disturbed due to an inability to purchase required amounts of cement during profit-building months. Some day, all of us may face a squeeze play—in reduced volume of business, higher costs but lower selling prices and payloads held within strict legal limits.

Ours is a young industry. Few operators were in business during the depression years. Not many of us have experienced even a mild recession. "Good Times" is not a good teacher. It hasn't been necessary to "play them close to the belt." Too few of us are cost conscious.

Uncle Sam's economy of the 50's is a vulnerable one. Not many families are in a position to maintain their standard of living if the start of a general business decline results in reduced salaries, lay-offs and shorter working hours. Home construction has gone at a whirlwind pace. Most of the backlog is gone. High building costs could accelerate a downward spiral of home, commercial and industrial construction. In rather fixed, high labor costs, we have accepted a future obligation that will sink some ready-mixed concrete organizations. Many companies will survive by convincing employes that everyone must join in an over-all campaign to trim costs. Key men's salaries, hourly rates, premium pay, fringe benefits and other personnel costs will have to be brought into line with recession realities. A sharp reduction in business volume will not be particularly damaging to a company prepared to sharply reduce its own fixed and variable, direct and indirect costs.

Some day, sooner or later, our industry will have to face the music of "lower sales, lower prices, and lower earnings." As an industry, how will we fare in years of less, little or no profit? In your own operations, are you prepared with a cost-cutting program to meet the threat of recession?

Your operation will take a long stride toward a brighter future if all personnel become efficiency minded. Generally speaking, things have been rather easy. Management has become careless. Labor has been allowed to drag. It is time for a change in pattern; waste water should be squeezed out of operations. Down the line, a better, more efficient job has to be done.

Another matter of vital importance is the quality of your concrete. Your continuance as a successful operator will be largely dependent upon your ability to process and deliver a quality product.

You and your key men, individually and collectively, should make a continuing effort to see to it that your company is getting the most out of:

1. Plant and delivery equipment;
2. Employe time, effort and ability;
3. Truck scheduling and plant coordination;
4. Work routines and control procedures;
5. Cement, aggregates and admixtures;
6. Tires, replacement parts, gas and oil;
7. Maintenance and repairs;
8. Overhead—including heat, light, power and rent.

The development of a cost-conscious, efficiency-minded, quality-concerned organization will be your best

A well-organized preventive maintenance program pays off in many ways, the author points out. Helpful in implementing a program is a record system listing all equipment, with such information entered as mileage, repairs done, major parts replacements, etc. (left). Of importance to any maintenance program is a well lighted, well equipped, roomy shop such as shown below

Operator's station in a central mixing plant, showing grouping of all controls, scales, indicators and charts in a space easily reached by the operator with a minimum of walking

insurance against "rainy days" that must surely come our way. Know where you stand on costs, margins, quality, efficiency and service.

Controls and Routines

You get the most out of equipment, materials and personnel through careful supervision of a skillfully organized operation. High standards of supervision and organization are made possible through the development and regular use of both proper routines and suitable control procedures.

Through effective production and dispatching procedures, you coordinate plant operations, material handling, deliveries and personnel performance. Through proper control procedures over mix designs, weighing, inspecting and testing, you assure the quality of both the materials which you use and your end product, ready-mixed concrete.

Too many operators attempt to restrict paper work to the office alone. Paper work belongs in all departments of our business. Paper work helps to establish routines that get things done in prompt orderly fashion. With proper routines, supported by effective records and reports, you get and keep control.

Procedures, (for our purpose, used interchangeably with routines), are the means by which all repetitive business action is handled. Careless operators improvise; careful operators painstakingly develop proper procedures to give themselves effective controls over operations, maintenance and service.

When you have adopted and are regularly using sound operating procedures, your costs are in line, you are getting efficient production and you are delivering a top quality concrete. If established routines are effective, personnel activities are coordinated; responsibility is placed; "buck passing" is stamped out and much unnecessary work is eliminated. When there are numerous exceptions to an established routine, that part of the operation is not functioning properly. Avoid improvisations and half-way measures or you will soon have trouble on your hands. Establish routines that are workable; see to it that they are made to work.

An alert ready-mixed concrete company seeks to improve operating efficiency by constantly improving its routines. Search for relatively permanent solutions to important problems and serious weaknesses. Plan and put into operation badly needed fundamental improvements. Improvements are worth while if they produce lower costs, increased production, added profits, better concrete or improved customer service.

A project for improving a routine can be a simple affair, (Example A); it can also be a rather complicated matter, (Example B).

Example (A)

Operation—hauling aggregates to area plants.

Routine—material hauled in straight axle trucks.

Problem—on straight time, high costs per ton mile. Considerable overtime necessary to move required tonnage.

Solution—purchase and use of several dump-trailer units.

Example (B)

Operation—mixing air-entrained concrete at a central mixing plant.

Routine—processing *slag* concrete in which air-entraining cement was used; mixing cycle approximately 2 min.; time of mixing actually based on completion, (including conveying cement) of weighing cycle.

Problem—varying air contents, as low as 2 percent—as high as 9 percent; low air content loads segregated; in high air content loads, low strengths developed and "sticky" condition of concrete irritated cement finishers—high loss of slump occurred in transit; checking and cracking of hardened concrete.

Study—developed that time taken to convey cement sometimes varied as much as 50 sec.; that mixing cycle varied from 1½ min. to 3 min.; that air-entraining cements varied considerably in air producing efficiency, prohibiting close control of air content; that some slag, as received, was dry and hot.

Solution—1. Standard mixing cycle of 2½ min. decided upon and enforced. 2. Regular cement used in place of air-entraining cement. 3. Air-entraining agent added at the mixer. 4. All slag, when received, wet down; hot slag given "cool off period." 5. Only slag of approximately uniform moisture content and temperature raised to overhead bins.

The effectiveness of your controls over operating costs, plant efficiency, concrete quality and employe performance rests upon: (1) The development and execution of proper procedures; (2) The selection and training of key personnel, properly equipped to skillfully supervise, control costs and assume responsibility for the quality of the product.

The man you select to be plant superintendent must know his job. He should have the knack of getting out production and be able to command the liking and respect of other employes. He should have adequate knowledge of care and operation of equipment. He should understand the fundamentals of quality concrete. Above all, he must be able to direct an efficient operation.

Efficient plants open every day on schedule. Plant men are on hand with their equipment rolling by the time the first trucks are in position for loading. You can't make on-time deliveries if you don't get the first round out on schedule. All equipment should be in shape for a full day's operation. To assure "breakdown-free operations," each day before leaving the job employes must check, clean, lubricate and complete required repairs to their equipment.

In an efficient plant operation, sudden breakdowns do not occur on equipment capably handled. At such a plant, equipment is carefully operated, thoroughly inspected, regularly lubricated and properly maintained. Highly competent personnel, working under an effective control program, prevent breakdowns by correcting conditions ahead of time. Generally, an unexpected breakdown will be proved an unnecessary one. A sudden break-

down is almost certainly a sign of careless operation.

Preventive Maintenance

Plant men who make daily inspections and regularly practice preventive maintenance procedures will enjoy breakdown-free operations. Men who are careless in their operations, always waiting until the last minute to report necessary repairs, will frequently be in trouble.

At a well operated plant, you will find fast, competent, rugged, dependable workers. You will find workmen who thoroughly understand mechanical operation of their equipment; men who properly maintain equipment entrusted to their care; men who observe the best safety practices.

Plant men must be absolutely dependable. Their on-time presence at work each day must be assured. No operator can afford to tolerate an irregular employe. If you take a chance on the shortcomings of such a worker, you'll find yourself in trouble on the big day. Plant workers must be sufficiently rugged to handle their daily jobs and the gruelling overtime assignments on days of peak production or breakdowns. Sometimes, they may have to work around the clock. It might be necessary for a weigh man to work most of the night so that equipment will be ready for the first morning round, then to weigh out trucks all day long.

At your own operation, closely check the efficiency of each man's performance. Hold him responsible for the condition of his equipment. Make certain that individual functions and operations are being efficiently performed. Demand prompt reports of necessary repairs. Whenever possible, insist that needed maintenance be done on straight time; require that full use be made of slow-downs and slow days. Some plant men regularly angle to do maintenance work on overtime Saturday. Stop them dead in their tracks.

Observe the crane operator at work. Is he smooth or jerky? Does he raise the material bucket in an easy, gentle sweep? Does he clearly try to avoid spillage into the wrong bin compartment? Does he drop the bucket in lowering it to the stockpile? Does he keep a good clean stockpile? Do bin compartments frequently run dry? Does he try to prevent segregation of aggregates? What is the condition of his equipment? What is his breakdown record? Are the cables of his machine in safe operating condition?

Study your weigh man. Does he always have a load ready or is he always holding up a truck? Does he work well with the drivers? Does he have rhythm or are his movements uncertain? How uniform are the batches? Are scales kept clean? Does he daily balance his scales? Does he hold close on his weights? Does he break even on cement? Is he alert to such difficulties as frozen or over-heated aggregates; weigh hoppers sticking; moisture fluctuations; bad gradations; empty bins; scale frictions and gate leakage? Is he efficient in charging truck mixers?

If you operate a central mixing plant, how about your mixer operator? Is he proud of his work? Does he hold concrete to a uniform consistency? Does he implicitly obey mixing time requirements? Is he alert to such troubles as stony or oversanded concrete; too much air; too wet or too dry; short yield; poor gradation; wrong temperature and failure to add admixtures? Are mixer and surroundings kept clean? Does he zealously lubricate and otherwise properly maintain his equipment? Is he always ready? How about down-time?

The weigh man in a batching plant and the mixer operator at a central mixing plant are vitally important employes. They should be perfectionists. On them rests prime responsibility for the quality of your delivered concrete. In your own operation, have you placed that responsibility in capable, trustworthy hands?

To work out effective plant maintenance and service routines, you must get the understanding and cooperation of operating personnel. You need similar support in building a cost conscious organization. It is relatively easy to convince a producer that he should have a plant superintendent to supervise operations. It is harder going when you try to convince him that someone should be giving continuing attention to the different cost factors of his operations.

Comparatively few operators can tell you their average cubic yard costs of plant men, drivers, maintenance and other burdens. Very few know what part of their hauling dollar goes to drivers or what percentage relationship exists between costs of materials and selling price.

The term "operations research" came into common usage during World War II. During the Battle of Britain, introduction of radar increased by a factor of 10 the effectiveness of The Royal Air Force. Later on, a small group of six trained men, applying only a scientific approach to get a more integrated defense operation, were able to double that new effectiveness.

Operations Research

In recent years, our big industrial giants have introduced operations research into their complicated setups. Such studies have paid off handsomely in reduced costs, better products and increased profits. This kind of thinking on an ever-continuing basis belongs in our industry. Someone in every ready-mixed concrete organization should be making a continuing effort to cut costs, raise production, improve service and increase profits. Someone in your operation should be given the responsibility for "keeping tab." This work can be efficiently accomplished through the effective use of simple records, reports, ratios, charts and graphs.

The responsible person should daily check such matters as make-ready operations, first round, coffeetime, bottlenecks, noon hour, last trip of day, washing out, breakdown of plant equipment, truck mixer down-time and maintenance accomplishments.

He should be continuously seeking the answers to such questions as: Can we improve make-ready, put away and maintenance routines? Is there too much lost time, effort and money? What are our unprofitable operations? How can we eliminate them? What changes are necessary? What improvements can be made? How can we cut down on handling costs? How can we reduce man-hour requirements? Are delivery costs in line with competitors? Are we getting good performance from our drivers? Should we go to bigger transit mixers? Should we central mix and use our truck mixers as agitators? Should we consider area plants to cut down lengths of hauls?

A daily report of operations should be worked out showing sales in cubic yards and in dollars, inventory changes, (amounts of aggregate and cement, received and used), number of employes, hours worked, trucks used, down-time, employe absences, etc. Daily reports should grow into weekly and monthly charts that will give you close yardstick control over plant men and drivers' costs, material costs, selling prices, and profit margins.

You and your cost-auditor should make a practice of consulting regularly with other key employes on such matters as are covered by these reports, together with other important cost problems that are a part of every operation. Similar considerations should be given to individual production problems which arise out of the operation of either a batching plant or a central mixing plant.

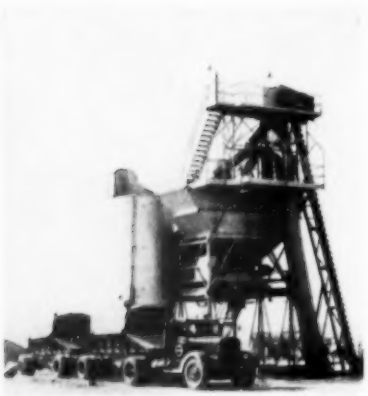
Promotional Booklet

HILLTOP BUILDING MATERIALS, INC., Cincinnati, Ohio, producer of concrete and other building materials, has published a booklet, "The Story of Hilltop Service," to enable people in the building industry to become better acquainted with the company and its products. The booklet, which is attractively illustrated, covers the history, personnel, policies, facilities and experience of the company. A complete list of the building materials produced and/or handled by the company is also included.

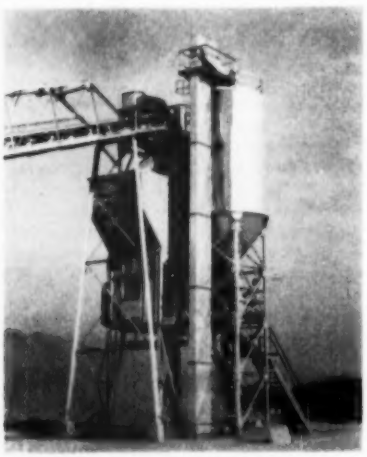
Ready Mix Short Course

THE OHIO READY MIXED CONCRETE ASSOCIATION is conducting its 1953 annual Short Course at the University of Toledo, Toledo, Ohio, January 21-23, 1953. R. P. Mumford is chairman of the Short Course Committee.

Ready Mix In The San Francisco Bay Region



Centerville plant of Pacific Coast Aggregates, Inc.



Kerlinger ready-mixed concrete plant of Pacific Coast Aggregates, Inc.

Pacific Coast Aggregates, Inc., ready-mixed concrete plant at Eliot, Calif.

WITH THE NATIONAL READY MIXED CONCRETE ASSOCIATION holding its annual meeting in San Francisco during the week starting February 22, it was decided to present a thumb nail sketch of the industry in the San Francisco Bay and the Sacramento-San Joaquin river (Central Valley) areas from observations of the editorial staff of ROCK PRODUCTS in trips covering several months of travel. It is hoped that the information will be helpful as a guide to those who plan to visit some of these plants.

For this reason the plant descriptions and illustrations will be centered on the northern California area, from Bakersfield to the Oregon border. Business in this zone has been excellent with yardage and dollar volume probably topping previous records. The industry is healthy and in strong hands with a liberal sprinkling of new plants, especially of smaller capacity in the less populated communities.

The Bay and the Central Valley areas of California are well supplied with ready-mixed concrete plant capacity. In San Francisco, for example, there are ten companies listed in the telephone directory, six in Sacramento, eight in Fresno, five in Bakersfield, and 14 in Oakland. There is also a liberal sprinkling of plants in practically all the other cities in the area: Napa, Salinas, Watsonville, Santa Cruz, Vallejo—to name a few.

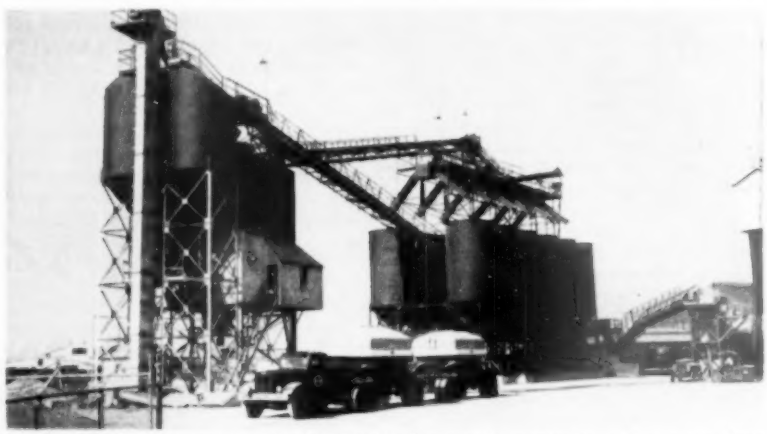
Two Regional Associations

California has two regional associations that include rock, sand and gravel and ready-mixed concrete operations in their membership. Covering the state from the Kern County line north of Bakersfield to the Oregon border is the Northern California Ready Mixed Concrete & Materials Association. However, most of the membership, both numerically and from a tonnage standpoint, centers in the San Francisco-Oakland Bay area. Eugene R. Booker is executive secretary with headquarters in San Francisco. A. W. Caldwell of San Jose is president, and A. G. Popkin is vice-president. The former is president of Borchers Bros., San Jose, and the latter is head of Consumers Rock & Cement Co., San Francisco. Sharing headquarters and staff with the ready-mixed concrete group is the sand and gravel group of which R. K. Humphries, general manager, Pacific Coast Aggregates, Inc., is president, and R. S. Barneyback, head of Henry J. Kaiser's sand and gravel production, is vice-president.

The other regional associations are the Southern California Rock Products Association and the Southern California Ready Mixed Concrete Association. H. G. Feraud is executive secretary of both groups.

The Northern California Ready Mixed Concrete & Materials Association has 54 ready-mixed concrete member companies and 19 member companies in the sand and gravel group. The association represents 90 to 95 percent of the productive capacity in the area served. The sand and gravel group last year handled roughly 13,000,000 tons of aggregate. The two groups pay dues into the association on the basis of number of productive employes. There are roughly 1000 such employes divided among teamsters, shovel "runners," operators and maintenance men. About 800 trucks are involved, most of which are ready-mixed concrete delivery units.

The executive staff of the association coordinates matters relating to labor relations and union negotiations. Legal and other directives that stream out of Washington, D.C., are screened by Mr. Booker, and the salient information is passed on to the membership in a condensed form. Railroad



East Oakland batching plant, to the left. The 12 silos contain aggregates, and a rotary dryer with a capacity of 30 t.p.h. may be seen to the right, Pacific Coast Aggregates, Inc.

Some of the largest and most modern ready-mixed concrete plants are to be found on the Pacific Coast. Plant descriptions on these pages may be helpful as a guide for inspection trips

By WALTER B. LENHART

Oakland, Calif., ready-mixed concrete plant of Henry J. Kaiser Co.

and trucking rates are scrutinized and appropriate action taken when necessary. In all these matters, the northern group works very closely with the southern California group. The northern association meets once per year on the third Thursday in March, but special meetings are called sometimes as often as twice per year.

Largest Producer In Bay Area

Pacific Coast Aggregates, Inc., is the largest ready-mixed concrete producer in the Bay and Central Valley areas with 19 batching plants, several of which are outstanding for size and modern engineering design. The Sacramento and East Oakland plants, which are practically identical, are the show plants of the company. The East Oakland plant, which possibly will be one of those inspected on the convention trips, was described in the September, 1947, issue of ROCK PRODUCTS, page 123. The Sacramento operation was covered in an article in the August, 1949, issue, page 225. Other large but older operations of this progressive company are in San Francisco and the Peralta street plant in industrial Oakland. The company has two plants in the San Jose area, one on Stockton Avenue and the other on Phelan Avenue. Other plants are at Daly City, South San Francisco, Hayward, Concord, Fresno, Selma, Visalia, and a part-time operation at Davis.

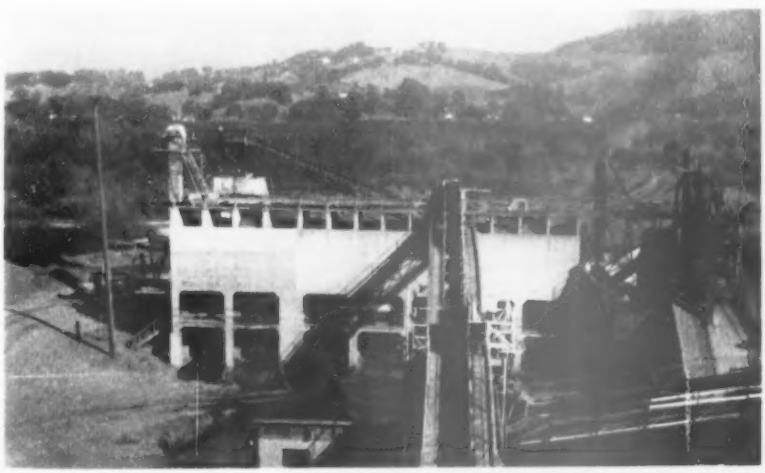
In addition to those mentioned, ready-mixed concrete batching facilities are available at the following locations where the company has sand and gravel production units: Eliot, Centerville, Fair Oaks, Kerlinger (near Tracy), and Lindsay. The San Francisco plant, adjacent to the company's main office, and the Daly City plants pre-mix but the others do not. The company has 105 mixer trucks at the various operations. The East Oakland plant features Mix-Kwik, a trade name for dry-batched concrete made up of pea gravel, sand and portland cement and marketed in 90 lb. paper bags. This plant, like the one in Sacramento, uses Conveyor Co. batching equipment, but in the smaller operations Noble batching equipment predominates.

The Kerlinger plant of Pacific Coast Aggregates uses Noble batching equipment. This type unit is so designed that about all that is needed to erect it are proper footings and a crane. Units are neat in appearance and usually can be quickly identified by their orange color and compact design. Bucket elevators mostly are used to handle the aggregate and bulk cement, but some plants use a crane to fill the aggregate bins. Another popular type of batching equipment is the Blaw-Knox system. The automatic weigh-batching system developed by the Conveyor Co. has been licensed to the Blaw-Knox Co. The Centerville ready-mixed concrete operation of the company, which uses this system, will possibly be inspected by the convention membership.

Produces Lightweight Aggregates

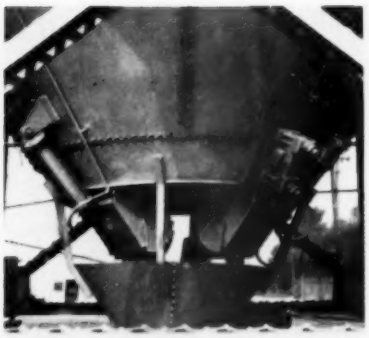
In the North Bay area, the Basalt Rock Co., Napa, Calif., has important ready-mixed concrete operations. This company, with its affiliate, Rocklite Products Co., is a leader in many fields of rock products processing. They include large quarry and crushed stone operations, including riprap and jetty stone, and at Healdsburg a sand and gravel operation. Several concrete block plants operated by the company are rated as outstanding in the United States by the concrete masonry industry. A. G. Streblow, president of the company, is also president of the National Concrete Masonry Association, and active in other associations. Ed. F. Brovelli is vice-president, and in charge of concrete and aggregate production. Mr. Streblow and his firm also have had wide and successful achievements in the ship building field, and the company is a large manufacturer of steel pipe and pressure vessels for household and industrial liquid-gas fuels. Being amply equipped with steel fabricating machinery, it is only natural that most of his ready-mixed concrete plants feature steel bins made by his own company.

The Basalt Rock Co. has 45 mixer trucks that deliver to a maximum 30-mile radius. Batching facilities are located in San Francisco, Vallejo, Napa, and Healdsburg. Other ready-mixed concrete plants owned by the company but leased to other operators are in Santa Rosa, Sonoma, and Petaluma. Two plants use Noble weigh batchers and two use Blaw-Knox. Fairbanks-Morse weighing equipment is found in some of the others. None of the plants is pre-mix. Laboratory control facilities are centered at Napa where lightweight

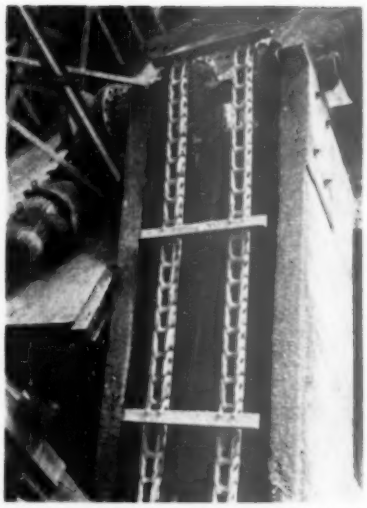


Ready-mixed concrete batching plant of Basalt Rock Co., Healdsburg, Calif., is to the left of the sand and gravel bunkers

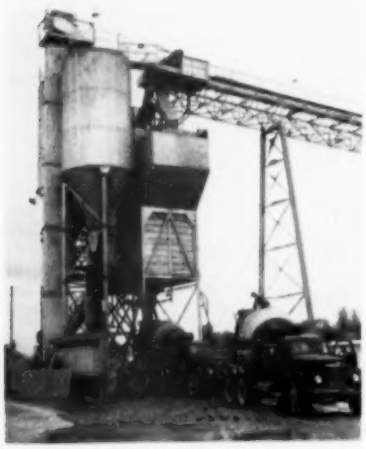
Tracy Rock & Gravel Co., concrete batching plant is located in a worked out part of pit



Air gates and electric vibrators on bins at Oakland ready-mixed concrete plant of Henry J. Kaiser Co.



Discharge end of chain drag used at Oakland plant of Henry J. Kaiser Co. to remove concrete washed off mixer trucks and collected in trough



Fair Oaks plant of Pacific Coast Aggregates

aggregate research and test work are also conducted. The company is building one of the most modern high capacity, lightweight aggregate manufacturing plants in the United States at a site near Napa. The plant will soon go into operation.

Operates Five Plants

The far-flung industrial empire of Henry J. Kaiser includes ready-mixed concrete plants at Oakland, Richmond, San Lorenzo, Stockton, and Radum, all in California. They all operate as a part of the company's sand and gravel division of which R. S. Barneyback, vice-president and general manager, is the nominal head. The batch plants are under the direct supervision of M. A. Marquard. The company has sand and gravel plants at Radum, Oroville, Upton, Felton, and Niles, all in California.

The Oakland 5th Avenue plant is located close to the downtown section. A bird's eye view of the plant can be obtained as convention visitors head south on one of California's "freeways" (Route 69) enroute to the Radum sand and gravel operations of Henry J. Kaiser Co., tentatively scheduled for inspection by the members of both associations.

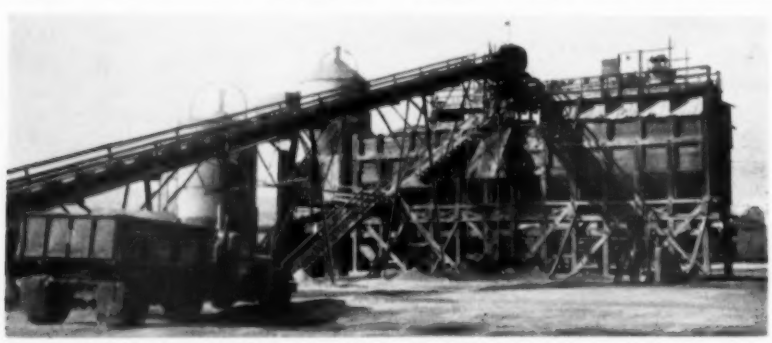
The Oakland plant of Henry J. Kaiser Co. receives aggregates by rail and truck, and portland cement is similarly shipped from the company's portland cement plant at Permanente, near San Jose, Calif. At Oakland, provision has been made to handle three types of portland cement. Although only two screw conveyors are in the plant, suitable gates can divert the three types.

Batching equipment is Conveyco automatic with dial scale which is also designed for manual cumulative weighing into a 2-cu. yd. Rex central mixing unit. Principally Rex truck mixers are used. Facilities are available for adding air-entraining agents, calcium chloride, etc., and Trico-sol and Pozzolith are normally used on customers' demand. The steel silos adjacent to the batching plant have air-operated gate controls with Syntron electric vibrators for aggregates that do not flow readily. Aggregates from these bins move by belt conveyors to a batch plant or to a shuttle belt over wooden truck loading bins. A Neptune water meter is used in the batching plant.

The truck washing facilities may be of special interest. They consist essentially of a rectangular tank with a deck above for the truck equipment and a ramp loading to the deck. In the rectangular tank is a very heavy, slow-moving drag-type conveyor unit for the removal of any concrete washed into the tank.

Premix For Better Slump Control

In the coastal area south of San Francisco, the Central Supply Co. is an important ready-mixed concrete producer with four plants at Watsonville, Pacific Grove (or Monterey), Salinas, and Santa Cruz. There are 22 mixer trucks, all with either Challenge or Willard mixers in 3-, 4-, and 5-cu. yd. capacities. Bulk cement is trucked to all plants with aggregates delivered mostly by rail. The Central Supply Co. is affiliated with the Granite Rock Co., and all coarse aggregates come from that company's crushed granite operation near Watsonville. Sand is hauled to the plants by rail and Central Supply Co. trucks. The newer 3-cu. yd. transit mixer trucks are cab-over-engine type. Three-axle chassis are used for the 5-cu. yd. units. Late truck replacements are International. All trucks are being painted a new color scheme featuring a dark green cab and orange-colored drum with the word "Central" in dark green on the drum. Haydite from San Rafael is also used at all plants.



Ready-mixed concrete trucks of Kern Rock Co. load in a depressed driveway to the left of bins

At all the ready-mixed concrete operations the Central Supply Co. has distribution facilities for a general line of building materials that range from plaster materials and masonry supplies to steel products. All the operations central mix for better slump control, using Noble weigh batchers and 1-cu. yd. Standard Machinery Co. mixers. No holding hoppers are used after the mixers.

All dump trucks are equipped with recording charts so that the hourly performance of the truck can be noted. This device records on paper all stops and the road speed at anytime. The recording chart, along with the driver's report, add up to better and more efficient operation and better concrete.

At a recent board meeting the following officers were elected: M. E. Woolpert, vice-president; Austin Zelmer, secretary and treasurer; Bruce Woolpert, acting general manager. Branch managers are: L. A. Biersch, Watsonville; J. R. McMillan, Santa Cruz; Ray Wasson, Salinas; and A. A. Dresser, Pacific Grove. Herb Hershman is asphalt plant manager.

Salinas batching plant of Central Supply Co. Transit mixer truck on the left is being loaded with lightweight concrete, and unit on the right with regular concrete. Rectangular box is holding hopper for lightweight concrete

Deliver Concrete 120 Miles

The Kern Rock Co., Bakersfield, Calif., has a ready-mixed concrete operation in downtown Bakersfield with a fleet of 23 Jaeger mixers mounted on Autocars. Bakersfield is the center of a large and sprawling oil industry as well as large farming areas that receive water from the Central Valley Project.

Ready-mixed concrete operations of this company are of interest to the industry for it probably delivers concrete farther than any commercial plant in the United States. The longest haul was 120 miles, but hauls in the 65-mile range are quite common. Dan Sill, owner of the company, is an individualist when it comes to concrete and does not accept many of the present-day concepts of how concrete should be mixed. If one wants to inspect some of his concrete jobs he will find a basis for this position. On all hauls, for instance, water is put in the drum first, after which the aggregate and portland cement are added. Near the point of use the mixer drum starts to function. The practice has been trouble-free.

The plant in Bakersfield uses a 4-cu. yd. hopper that operates on a track under the bin. The track hopper is essentially a traveling scale hopper and the operator rides it. The scales are Hardy units. Portland cement is weighed into the hopper after the aggregates have all been added. At the end of the row of bins is a depressed passageway for the mixer trucks and these pass under the traveling hopper to receive their loads.

Aggregates from the company's sand and gravel operation are delivered to the plant by a fleet of seven Autocars equipped with 20-ton Fruehauf rear-dump bodies. The sand and gravel plant of the Kern Rock Co. was described in the February, 1947, issue of ROCK PRODUCTS.

S. M. Bryson is assistant manager.

Santa Cruz concrete batching plant of Central Supply Co.

Mason Contractors Convention

MASON CONTRACTORS ASSOCIATION OF AMERICA will hold its annual convention and exhibit at the Sherman Hotel, Chicago, Ill., February 1-4, 1953. Advance registrations indicate that a record in attendence may be established.

Particular attention will be devoted at this convention to apprenticeship programs, an important phase of M.C.A.A. work, and the apprenticeship committee will review progress of this program throughout the country.

Another feature of the convention is a series of forums. An exchange panel forum will discuss mutual problems of M.C.A.A. and the National Concrete Masonry Association. Benjamin Wilk, Standard Building Products Co., Detroit, Mich., (past president of N.C.M.A.), will serve as moderator. Other panel members will include: John Strandberg (past N.C.M.A. president), Concrete Building Units Co., Kansas City, Mo.; Ralph Condo (N.C.M.A. member), James Condo & Sons, Sommerville, N.J.; William E. Tucker, M.C.A.A. research board chairman, Richmond, Va.; and H. R. Nemec, M.C.A.A. member, Cleveland, Ohio. (During N.C.M.A.'s convention in Cleveland, Ohio, January 26-29, 1953, this same panel, with William Nelson, M.C.A.A. president, as moderator, will appear on the program in a discussion of concrete masonry problems.)

Another forum scheduled for the M.C.A.A. meeting will discuss new and more effective ways of handling material and the use of machinery to increase efficiency and lower operating costs.

Quality Stressed At Southeastern Meeting

Convention of southeastern regional group of N.C.M.A. reported excellent prospects for products industry. Suggest need for closer control of moisture in block manufacture, improved public and employe relations, and a more consistent advertising program

ALMOST THREE HUNDRED PEOPLE including some 60 wives went to Miami Beach, Florida, to attend the ninth annual southeastern regional meeting of the National Concrete Masonry Association. The meeting was held at the Casablanca Hotel, November 24-26. Twelve officers and directors of N.C.M.A. were present, from distant points, including president A. G. Streblow who came from Napa, Calif., to lend his support to this thriving and progressive regional group.

California was not the farthest point represented. There were several present from the state of Washington and one producer from Oregon. In all, there were N.C.M.A. members from 22 different states. However, the big majority was from Florida, Alabama, Georgia and from other southern states reaching from Kentucky to the south and from the Carolinas on the east coast to Texas. A good number of those in attendance consisted of production superintendents, attracted because the program included tours of the leading concrete masonry plants in the Miami area.

Miami and Miami Beach have long been recognized as comprising an area where concrete and concrete products are the standard construction materials for all classes of construction, from the smallest residences to the large, pretentious hotels costing millions of dollars. Consumption of concrete masonry units in the area, per capita, is tops for any metropolitan area in the United States. Those who had never been to Miami expressed amazement at the volume of concrete units used. One company alone is said to produce some 15 million 8-in. equivalent units annually. The big majority of exposed concrete masonry walls, however, are plastered and they are either snow white or colored in pinks, blues, greens and other colors pleasant to the eye.

The reputation of the Miami area as a standout center for concrete masonry construction, and all the opportunities for pleasure and relaxation afforded, were an attraction but our guess is that the registration would have been nearly as great if the meetings had been held elsewhere in the southeast. This group of producers comprises N.C.M.A. members who are strong supporters and endorsers of the national organization but who find it of great practical value to meet once annually for discussion of problems of localized concern to those in the southeast. Activities of the local group supplement, regionally, activities of the N.C.M.A. conducted on the national level.

George W. Katterjohn, president of Katterjohn Concrete Products Co., Paducah, Ky., and a past president of N.C.M.A., was the prime mover in getting the southeastern members to hold annual meetings. He was given a vote of thanks, at this meeting, for having done most of the work each year in connection with the annual meetings. In order to further and enlarge the activities of the southeastern group, these producers officially organized at Miami Beach and formed a Southeastern Regional Association of the National Concrete Masonry Association.

George Katterjohn was elected president; N. A. "Doc" Rinker, Rinker Materials Corp., West Palm Beach, Fla., first vice-president; Frank L. Williamson, Holloway Concrete Products Co., Inc., Winter Park, Fla., second vice-president; Lewis Lloyd, Alatex Construction Service, Inc., New Orleans, La., third vice-president; and William R. Ireland, Atlanta Aggregate Co., Inc., Atlanta, Ga., secretary-treasurer.

In addition to the officers, a board of directors of eight was elected. The board comprises, in addition to the officers, Herbert Jahncke, Jahncke Service, Inc., New Orleans, La.; Carroll Strohm, Jr., Nashville Breeko Block Co., Nashville, Tenn.; M. M. Orovitz, Alfred Destin Co., Miami Beach, Fla.; Clarence I. Needham, Aquatite Tile Co., Bradenton, Fla.; E. M. Barnes, Knox Concrete Products, Inc., Knoxville, Tenn.; J. Roy Pennell, Spartanburg, S.C.; Leon K. Camp, Camp Concrete Products Co., Columbus, Ga., and H. A. McGee, Jr., Farmers Concrete Products, Inc., Orangeburg, S.C.

Business sessions covered marketing, plant operations, specifications, public and employer-employe relations, the outlook for construction, and were planned for maximum audience participation.

After brief introductory remarks and invocation by Reverend Lewis H. Head, pastor of the First Methodist Church, Coral Gables, Fla., the meetings opened with a welcoming address by Vice-Mayor Burnett Roth of Miami Beach. Mr. Roth touched upon the various facilities available, predicted a banner year for business in the area and gave recognition to the concrete products industry for its important part in the growth of the area. Keys to the city were presented to A. G. Streblow, president of the N.C.M.A.; E. W. Dienhart, executive secretary, N.C.M.A.; George Katterjohn; and "Doc" Rinker.

On sightseeing boat. Left to right: Bill Markert, N.C.M.A., Carl Smithwick, Portland, Ore., and Harold Lutes, Spokane, Washington

Business Conditions

Short reports on business prospects for the various southeastern areas were then given.

A. E. Lloyd, Alabama Cement Tile Co., Birmingham, Ala., had a chart to show, graphically, the trend in sales as compared to productive capacity over a ten-year period in his marketing area. His chart showed the productivity in terms of 8-in. equivalent units. Plant rated production was based on an 8-hr. day, five days a week, and on 50 weeks of operation annually.

The sales curve was below the productive curve back in 1940 which was at a time when there was little production equipment in the area. Productive capacity is now rated at nine million 8-in. equivalent units. The sales curve over the 1942-1952 period, has continued to exceed the production capacity curve, with the widest spread in 1950 when sales volume was approximately 13 million 8-in. equivalents. There was a leveling off of sales activity in 1951 and 1952 due to restrictions on private construction in an area where there was little government spending for defense projects. Mr. Lloyd predicted that there will be an upward swing of the sales curve in 1953, and he anticipates that productive capacity in his area might increase by some 1¼ million units annually.

Leon Camp, Camp Concrete products Co., Columbus, Ga., had an optimistic report on business prospects. His plant is centered in an area that had always favored clay brick construction until a few years ago. Starting about four years ago, the use of concrete masonry was aggressively promoted and sales have been at the expense of clay brick.

Concrete masonry is being specified now for an eight million dollar school building program. Schools had been customarily built of 12-in. clay walls but the new program will use 4 in. of clay brick and 8 in. of concrete masonry backup. Every one of the 159 counties in Georgia has a school building program, involving at least one new school in each county. Concrete masonry will be used as backup or for the entire wall thicknesses in these projects. The outlook is considered good.

Sam Bailey, Jackson Stone Co., Jackson, Miss., reported that his area has had little benefit from government spending for construction. As a result, the state has not enjoyed the prosperity which other states have had but there has been progress made in recent months, and there is a hospital and a few schools to be built. As he expressed it, the Truman administration in Washington must have had it in for Mississippi but conditions now look better.

H. J. Stockard, Jr., executive secretary and treasurer, North Carolina Concrete Masonry Association, Raleigh, N.C., reported for the entire membership of his local group, which is doing an outstanding job in the promotion of concrete masonry construction. He principally reported on 1952 activities of the association which was organized in an area where clay brick had long been the recognized masonry construction material.

A major accomplishment in 1952 was obtaining a reduction in insurance rates charged individual plants. This concession, which amounts to approximately the budget of the association, is an excellent example of how valuable organized activity can be for members of an association.

Speakers' table at main luncheon. Left to right: Geo. Katterjohn, Paducah, Ky., past president of N.C.M.A., and first president of Southeastern Regional Association, N.C.M.A.; A. G. Streblow, Basalt Rock Co., Napa, Calif., president of N.C.M.A.; featured speaker, Vash Young; M. E. Rinker, West Palm Beach, Fla., and E. W. Dienhart, executive secretary, N.C.M.A.

Left to right: Mr. and Mrs. Otto Buehner, Salt Lake City, Utah; Mr. and Mrs. A. G. Streblow, Napa, Calif., and Mr. and Mrs. Herbert F. Geist, Cleveland, Ohio

Left to right: Mr. and Mrs. Sam Paturzo, Baltimore, Md., and Mr. and Mrs. C. Boyd Ross, Baltimore

From left to right at table in foreground: Mr. and Mrs. H. O. Pommes, Memphis, Tenn.; Mrs. C. I. Needham, Bradenton, Fla.; Mr. and Mrs. Sam M. Bailey, Jackson, Miss.; C. I. Needham, Bradenton, Fla.; Mr. and Mrs. Doug. Williams, Owensboro, Ky.; Mr. and Mrs. H. A. McGee, Jr., Orangeburg, S.C.; and Mr. and Mrs. H. J. Shinall, Little Rock, Ark.

Harold Lutes, Spokane, Washington, left, and Carl Smithwick, Portland, Ore.

Presently, the association is working to gain insurance rate adjustments covering concrete masonry structures, the present rates being in favor of clay brick construction.

Promotion is being pushed hard. The association is working actively with North Carolina State College and contributing to architectural and

Mr. and Mrs. Jay E. Ehle, Cleveland, Ohio

engineering foundations at the college. A quality concrete conference is to be sponsored. A booth was taken by the association at the North Carolina State Fair to tie in concrete masonry with the agricultural program. The industry is represented at meetings of contractors, masonry apprentices and other groups, and does considerable entertaining for architects and engineers. Some 26 interpretive letters on subjects pertinent to the membership were sent out from the association office in 1952.

Lewis Lloyd, New Orleans, La., leaving boat

This organization keeps stressing the need for quality in concrete masonry units. Monthly tests of units are required from each member as a check on quality. There has been a ten percent increase in membership over the past year and business is expected to be very good at least through the early months of 1953.

R. J. Kennedy, Jr., Ken Block Co., Savannah, Ga., who is serving as secretary of the new Georgia concrete masonry association, said that his group has undertaken an aggressive program of sales promotion. Much of it has been directed at the architect. The industry in Georgia had a display at the southeastern meeting of the American Institute of Architects at Atlanta, Ga., and has been active in entertaining architects as well as state officials.

Business was reported as being relatively good and volume of business in 1953 is expected to be as good or better than in 1952.

Much of the business volume has resulted, he said, from the promotion job that is being done by the N.C.M.A. and P.C.A., which has enabled the industry to supply concrete masonry units for defense projects. The large school building program throughout Georgia is of great importance to the industry. Mr. Kennedy expressed the indebtedness of his group to the P.C.A. for obtaining recognition of concrete masonry in the county specifications that govern.

Reports from other areas were not given but apparently school construction and other public building will be active throughout the southeast and the concrete masonry industry will be affected in proportion.

W. R. Ireland, president, Atlanta Aggregate Corp., Atlanta, Ga., presided for the session on marketing. In his opening remarks, Mr. Ireland extended an invitation to those present to attend the quality concrete course to be held, February 2-4, at Georgia Tech in Atlanta, Ga. This will be the third such meeting and will give much emphasis to prestressed concrete.

Advertising

Robert E. Clarke of Robert E. Clarke and Associates, advertising agency of Miami, discussed the types of advertising that prove most effective. Mr. Clarke and his organization have been in business since 1929 in the area and have handled the advertising of Maule Industries, Inc. for the past five years. Maule is the largest producer of aggregates, concrete products and ready-mixed concrete in the area, in addition to handling a complete line of building materials.

Mr. Clarke started off by saying that far too many people in the building materials industries are complacent as far as selling effort is concerned. Too many also, in his opinion, confine their sales messages only to regular customers including architects and builders, and limit their efforts to direct mail, notices and small cards in trade magazines.

He stressed the need for advertising to meet the competition from new building materials that are rapidly developing. While it is a big job to keep builders and architects sold on a product, he urged that the builder who constructs his own buildings not be neglected.

Among all the media for advertising, which should be used for mass selling, he believes the daily newspaper to be basic to any well-planned program. Newspaper advertising should be provided for, first, in setting up a budget, and other forms of advertising including radio, billboard and television are supplementary tools, he said, which are effective in an overall program.

Due to the fact that architects have a code that prohibits them from advertising and because many builders do no advertising because they have no appreciation of its value, Mr. Clarke said that the concrete products producer has an opening to do a type of advertising which both architect and builder will appreciate. As examples of how such advertising should be written, he read some typical advertisements by Maule Industries which ran in newspapers. They were simple in character but written so as to be read. Many of them give special recognition to the architect and the builder, and urge the prospective builder of a home or other structure to contact reliable architects and builders while at the same time plugging for concrete masonry.

Copies of such advertisements as printed in the newspapers are also sent to the architects and builders to make certain that they, as well as the public, read them. Advertisements are designed to encourage people to own their own homes and the main theme is to sell them on the idea of using concrete and concrete products for their homes. Examples were cited to prove how such advertisements actually created markets by inducing individuals to build homes.

Mr. Clarke put in a plug for diversification of products, pointing out that a number of relatively small volume items can total to a sizable amount of business. As an example, Maule manufactures precast concrete stepping stones. One advertisement covering this item brought in hundreds of customers prepared to buy and haul these units in their own cars and trucks.

Mr. Clarke, in reply to questions, gave some practical pointers on the placing of advertisements for best pulling power. As to timing, he believes that Monday is the best day to run advertisements in newspaper afternoon editions, because most peo-

ple like to spend Monday evenings at home to read. He considers Monday morning papers very poor ones in which to advertise and Sunday papers are to be avoided unless large, expensive advertisements be run in order to compete with the large volume run on Sundays. Of the morning papers, those on Tuesday, Wednesday and Thursday are preferred, according to his experience.

As far as size of space run is concerned, he places advertisements from one-quarter page up to 50 or 60 column inches in size. A one-time insertion is to be avoided. He recommends that at least four repeat ads be run in order to gain best results for the money spent.

As far as position is concerned, he thinks that that is far less important than quality of advertising, referring to layout and art work. High quality advertising will bring far better results even when positioned poorly than will a poor ad in a favored position, according to his experience.

In reply to a question on the advisability of using television and radio advertising, he said that it depends on the individual type of business. He would never advocate the use of these media for concrete products unless a large budget be available. Maule Industries, as an example, spends 75 percent of its advertising budget on newspaper advertising, and the balance is divided among radio, television, direct mail and other media.

In reply to a question as to the amount of money to be spent for advertising, he suggested that it be from 1½ to 3 percent of gross volume of sales. If a manufacturer believes that he cannot afford 1½ percent, he said that that manufacturer should not advertise at all. In closing, he made the suggestion that a good advertising agency be engaged to handle the advertising program.

Public Relations

"Sales and Public Relations" was the subject of a very enlightening talk by Frank Dunbaugh, instructor in sales promotion, University of Miami. As far as merchandising is concerned, he said that the approach is not to sell a product as such but to create a situation where the potential customer wants to buy. The merchandiser, to be successful, must arouse the customer's emotions through use of approaches that are eye-appealing, pleasing to the ears, cause excitement or in other ways appeal to his emotions.

As an example, a producer cannot be successful in merchandising if his approach be to try to peddle a "cold, hard concrete block." Rather, he must tell of homes of beauty built with his products, how safe they will be from fire while the owner is enjoying a vacation away from home, and use other such approaches.

On the subject of public relations, he said that it is one arm of the selling job which consists essentially of doing good and letting people know about it. If there be a desire to obtain editorial space in a newspaper or other publication, the approach of trying to tell the editor to give such space will not be successful. Rather, the job is to get the editor to come to the manufacturer for the news in question.

Successful public relations require that a producer or manufacturer tell the truth and not over-sell. He must play square with the public and with the editors whose aid he seeks to enlist. Other suggestions were enumerated as essential to good public relations. For one thing, the merchandiser must not monopolize the talking, never argue or be guilty of an untruth. He should study his prospects and get his sales story organized. If the approach is to be one of service, he should stick to that theme and hammer away with it.

Where complaints are involved, the manufacturer should never wait for the customer to call on him but should make the first contact with a view to explanation or correction. The place of the telephone operator is considered very important, and it was suggested that telephone operators be checked over the telephone to find out whether or not they are courteous or may be discouraging customers by their attitude. Mr. Dunbaugh concluded by saying that manufacturers must paint a picture that will make people want to buy, and that the approach should be to try to get a customer rather than a sale.

Florida's Economy

The first morning session concluded with a talk, "Forging Ahead with Florida" by R. D. Roberts, vice-president, Florida Power and Light Co., which was designed to acquaint his listeners with facts and figures about Florida and its economy. It also served as a talk suitable for an enthusiastic member of any hard-hitting Chamber of Commerce. Mr. Roberts was an excellent and forceful speaker and his figures on the growth and development of Florida were interesting and well received.

R. N. Christy, Marietta, Ohio, left, and C. Boyd Ross, Baltimore, Md.

According to his figures, Florida has been the fastest growing state in the U.S. covering the 1930-1950 period. Its population growth was 89 percent over that period during which California was second with an increase of 86 percent. Population of Florida was 400,000 in 1890 and the figure was 2,750,000 in 1950. Population is expected to increase to 8 million by 1980.

Mr. and Mrs. Horace W. Bush, E. Orange, N.J.

Similarly, the Miami area has led in growth as compared to other metropolitan areas. Over the 20-year period, the population growth of Dade county wherein Miami is located was 242 percent. Population of the Miami area was 500,000 in 1950 and is expected to increase to 1½ million by 1965.

Throughout his talk, Mr. Roberts

Left to right: W. R. Ireland, Atlanta, Ga., Carrol Strohm, Jr., and Geo. Katterjohn

emphasized that there is stability in the economy of the Miami area. To prove his point, he cited the growth of the area even during the depression of the 1930's, and he gave building construction figures that revealed consistent leadership in housing starts throughout recent years as compared to the nation's other metropolitan areas.

Another criterion of growth was in electric power consumption. Florida has 342 cities and the electric power requirement was 210,000 kw. at the time of V-J day. The figure was 503,000 kw. in 1951. Power capacity is expected to be increased to 1,400,000 kw. by 1962 which will require expenditure of $332 million, largely to come from outside sources.

Miami, according to Mr. Roberts, has the nation's most important international airport, with some 37 percent of the total travel outside the United States leaving from Miami. Because Miami summers are mild (he says), with fewer plus 90 deg. temperature days than any other large city, summer business is gaining in volume to approach the winter season.

Operating Problems

The second business session covered operating problems, employer-employe relations and the construction outlook for the concrete masonry industry, under the chairmanship of Major Maurice Orovitz, president, Alfred Destin Co., Miami Beach.

Hugo Quillian, Quillian Concrete Co., Daytona Beach, Fla., was the first speaker and his subject was "Curing and Moisture Control." Most of Mr. Quillian's comments were concerned with a new plant built by his company which was very interesting because the plant was designed for steam curing. This is unusual rather than the rule in Florida where open-air curing is common practice.

Quillian Concrete Co., decided in 1951 to build a new plant from the ground up which was planned to provide close control over manufacture and the quality of concrete block with emphasis on adequate curing. Concrete block had been losing ground in this area with a trend back to clay tile and frame construction due to poor performance records, and the new plant was the starting point in a program to regain markets for commercial and public buildings.

It was decided that control was necessary, in manufacturing, beyond the molding stage, and that block of chemical stability must be produced for delivery as the solution to cracked walls. Autoclaving was considered but was too expensive and it was decided to set up for controlled high temperature curing. The design provided for the manufacture of low-moisture content block in view of the tendency of specifications in that direction, and to enable the manufacture of lightweight units, should the need arise later in the future.

The plant was designed on the basis of what was considered optimum practice in leading plants over the country. Layout of the plant was described by Mr. Quillian. The plant is rectangular with a bank of curing kilns, or cells, the distance from the block machine to the open ends of the kilns being 40 ft. It was decided to have ten small kilns rather than large ones for purposes of better control of operation. They may be filled from either side or from one end, and pumice concrete units were used for their construction with vermiculite fill in the cells. The doors are tightly sealed and insulated.

The roof is of flat-slab, reinforced concrete construction designed for 200 p.s.f. live load so that it may be used for storage. The ceiling is covered with ¾ to 1 in. of vermiculite plaster and has a vapor barrier. A 40-hp. Vapor steam generator was installed, capable of delivering steam for curing 90 seconds after starting. Distribution of steam is through a 2-in. header which is tapped with 1-in. lines leading into each curing cell. A 2- x 2-ft. exhaust door was provided at the back end of each cell. One block machine is in production and it requires 12½ hr. to fill the ten cells, eight of which are now in service.

After the door of a kiln is closed, there is at present a retention time of 1½-2 hr. before the steam is introduced. An automatic valve cuts off the steam when the air temperature in the kiln reaches 170 deg. F. The soaking period after steaming has been varied and is still under study, for optimum results.

Units are of crushed stone and sand, using standard portland cement. As far as results are concerned, the curing cycle has been effective in attaining 70 percent of desired 28-day compressive strengths in seven days and 90 percent in 10 days. Moisture content is in the range of 14-20 percent.

After a few months of operation it has been found necessary to obtain better distribution of heat and moisture in the kilns. A movable fan for exhausting steam may be desirable, and more generator capacity would also be desirable, probably of 100 hp. rating. Differences in the behavior of various cements have presented problems.

However, the benefits from controlled high temperature steam curing have been many. Units of identical properties may be supplied consistently regardless of the weather, all of which are adequately cured. They may be handled earlier, there are fewer culls and inventory has been reduced.

Preventive Maintenance

Some practical suggestions on how to gain maximum output from block machinery were brought out in a talk, "Preventive Maintenance," by Jay Ehle, vice-president, Cleveland Builders Supply Co., Cleveland, Ohio. Mr. Ehle started with a brief de-

No Job is Too Large
or Too Small For MAULE
When specifications call for quarry, concrete products or builders' supplies ... Maule is always first and foremost in the minds of South Florida builders, contractors and construction engineers.
They know that Maule products are always of the highest quality ... quality certified by the finest testing laboratories. They know that Maule deliveries are accurate and on time ... that Maule prices are always in line.
And they know that Maule is geared, equipped and staffed to handle any job ... large or small ... with promptness, efficiency and economy.
Yes, no job is too large or too small for Maule. So, when you build, when you remodel ... even if you just need a new sidewalk or a garden wall — Call Maule ... for more than three decades Florida's leader in quarry, concrete products and builders' supplies.
Call Maule For Highest Quality
Certified Concrete Building and Column Blocks
Central and Transit Mixed Certified Concrete
Colony Concrete Roofing Tile
Concrete Aggregates
Concrete Joists
Cement
Concrete Brick and Stepping Stones
Reinforcing Steel
Lumber
Millwork
Builders' Supplies
Phone 9-2881
MAULE
INDUSTRIES, INC.
Sales Office: 3075 North Miami Ave., Miami 37, Florida

Striking advertisement of Maule Industries, Inc., which lists the numerous concrete building products and materials this company produces

scription of his plant which is one of the largest and best-managed operations in the United States.

The plant is a hillside operation which permits trucks to deliver aggregates, cement and coal directly into the bins via an overhead ramp. This feature of design eliminates, from the start, the problems of maintenance of elevating and conveying equipment.

Four Besser Vibrapac block machines are in production, each served by a 50 c.f. mixer. This is one of the first plants to use a turntable in front of the machines as a space-saver in the handling of racks, using two 108-block racks on each table, which are spotted by a push of a button for the convenience of the lift truck operator.

Ten curing kilns each have a capacity of 2500 block. Undercover storage space will accommodate 500,000 units and yard storage is provided for 3 million units.

It was discovered that most of the breakdowns causing stoppage of production occurred between 1 and 1:30 p.m. which is shortly after the lunch hour. Time clocks, installed for the purpose of checking, showed this to be so conclusive that a pattern of preventive maintenance was adopted to minimize these breakdowns.

The plant has a superintendent, an engineer and two working foremen, one of whom is in charge of maintenance. At noon, the production foreman, maintenance foreman, lintel machine operator and tractor man go over each machine while the crews are having lunch. They search for loose bolts and faulty wiring, and inspect the feed drawer and other potential trouble spots. This is done in 30 minutes and these four men eat that much later than the others. The point emphasized is that each of the four men has a regular job.

The tractor repairman is also a driver. Seven tractors are in use, one of which is a spare, and they are greased and repaired from 9:30-11:30 in the morning. Each week an entire day is set aside for full-scale work on a tractor.

The company has other operations than the concrete block plant and a circulating crew of men handles the electrical work for all plants. Every two weeks, three electricians put in a Saturday or Sunday going over the 40-odd motors in the plant, when they check switches, change contacts and perform other repair jobs. The company makes it a practice to have a large stock of parts on hand.

In conclusion, Mr. Ehle said that the best approach is to determine the times when most breakdown troubles occur and take preventive steps just before those critical periods. His program has reduced total downtime to one hour per week.

Employer-Employe Relations

Herbert G. Jahncke, vice-president, Jahncke Service, Inc., New Orleans, La., in a talk on the subject of employer-employe relations, covered the problems in dealing with labor today and outlined the program of his own company in handling labor relations. Mr. Jahncke was well qualified to cover the subject, being vice-president of the National Ready Mixed Concrete Association and an official of a concern that is successfully dealing with the problem.

Jahncke Service is a comparative newcomer in the concrete masonry business but is well-diversified in the building material business. It is one of the largest and oldest concerns in the United States and is a producer of sand and gravel, shell, ready-mixed concrete, lime mortar, plaster, concrete pipe and block. Among other activities, the company is a large hydraulic dredge contractor and handles lumber, steel and other building products. The payroll covers 750 employes and annual sales are approximately $12 million.

Mr. Jahncke started out by comparing the attitudes of workers today with what they were in years past. Whereas work used to be considered an honorable activity, that is old-fashioned today when the majority of workers are demanding security and not expecting opportunity. In the early days, bargaining consisted simply of a man and an employer drawing up an oral agreement as to conditions of work and pay, which was all that was necessary when people of good faith were dealing with each other. Today, hours, vacations, insurance, pensions, pre-arranged schedules for raises in pay, etc., are the foremost things in the minds of applicants for jobs.

Jahncke Service has a record of having many workers wearing service pins in recognition of 25 years or more of employment, due to a policy of being very careful in selecting men who are likely to stay and grow with the company. It is a rare thing for a man to be fired. The company recognizes that it has an investment in each worker which it is prepared to protect and follows a practice of promotions from within the organization whenever practicable.

A group-insurance plan is in effect covering health, accident and life, financed equally by each employe and the company. Payments are according to the salary levels. The company pays the life insurance premiums for certain individuals.

Two forms of profit-sharing plans are in effect. The one is based on length of service and is distributed at Christmas, ranging in amounts from ½ of one percent of the annual pay for employes of 3-6 months duration to as high as eight percent for those with 25 years of service. The second plan is a reward for effort, given to certain key men at the end of the fiscal year, which is based on a fixed percent of profits after taxes. Foremen and department heads are rewarded with bonuses tied to department profits.

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Advertisement which emphasizes stability and beauty of structures made of concrete

Group inspecting heavy roof slabs at Maule Industries plant

These plans have proven good in building morale. The company believes in the principle that workers are not just a commodity but individuals who want to be recognized, respected and appreciated and who know they can come to management for discussion of their problems.

Workers of the company are partly unionized, and experience with the unions has been good through a policy of the company wanting to get along with them. One important thing, according to Mr. Jahncke, is that loyalty, first and foremost to the company, be instilled in the workers. This has been so effectively done that the company usually wins out in bargaining with unions on controversial points. In closing, he stressed the need for spelling out company policies to new workers, and emphasized that employe relations must be considered just as important as customer relations.

Construction Outlook

William P. Markert, director of promotion, N.C.M.A., in a talk covering the "Construction Outlook for the Concrete Masonry Industry," outlined a steadily growing market as available but which will require aggressive merchandising by the industry in order that concrete masonry will continue to be used and gain in acceptance.

He cited the 1950 population census as evidence that there will be no letup in the demand for new construction in the near future. The rate of population growth is at an all-time high. Some 3,900,000 babies were born in the last year which is at the rate of 75,000 per week, which means a growing demand for more living space. Net population gain was 2,650,000 in 1951 alone, and the annual rate of gain indicates a population increase of 20-23 million people for the nation in a 10-year period.

School building will be of boom proportions in the immediate years ahead. Volume of school building had increased from 72 million sq. ft. in 1948 to 110½ million sq. ft. in 1950, for the 37 states east of the Mississippi river, which figures point out the rapid rate of growth. High school construction is expected to boom at least until 1960, and, as babies are born, many families must have larger homes.

With all this growth in population, Mr. Markert pointed out that there will be a proportionate increased need for community centers, electricity, water, stores, drive-ins, churches and recreational facilities.

Biggest of all construction markets for the concrete masonry industry is housing which was at the rate of $12 billion in 1950. A rate of one million new starts per year is expected to be maintained, according to figures Mr. Markert mentioned as coming from the recent home builders show held in Chicago.

Mr. Markert then launched into a discussion of advertising and sales promotion in order to hold and enlarge markets, and he mentioned the threatening inroads of competitive materials which must be met.

According to a N.C.M.A. survey, the membership is spending at the rate of $60,000 a year for newspaper advertising. Much of this expenditure is being wasted, he said, in poor advertising that has no selling value. There is need, he said, for effective programs of advertising that will preeducate prospects, promote the sale of new products, describe new methods of production, stress service and otherwise have messages that build customers.

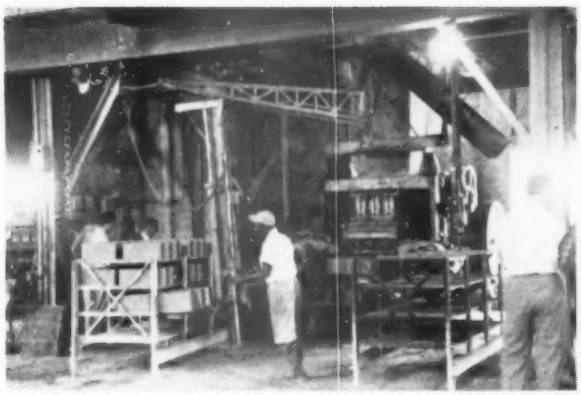
It is a serious mistake not to advertise because business is good, he warned; rather, continuous advertising should be run to keep the industry's products oversold.

As an example of how markets may be lost, he mentioned that poured concrete is displacing concrete masonry in Detroit, Mich., and in Washington State. The building of basement-less homes is also hurting a market that always has been of great importance to the industry. As a result, the problem now is to rebuild the below-grade market which had been neglected while the industry was striving to have its products specified for above-ground construction.

Other examples were given to emphasize that the industry cannot be content to just take orders for its products. The clay industry is taking active steps to regain markets that were being lost to concrete masonry. The new "SCR" clay brick which measures 2⅛- x 11½- x 5½-in. is proving of interest to many home builders. It requires no backup, reduces the time of masons and has other advantages compared to the old brick that are being actively promoted. Tilt-up construction and lumber are being advertised to increasing degree.

According to a survey by a national home magazine, from which Mr. Markert quoted, concrete block scored the lowest by far in a preference poll of prime building materials, which is indicative of a big job to be done. If the industry could be successful in having its units specified for just 3 percent more homes in the $15,000 class, that modest increase would mean an increase of $15 million in gross income for the industry.

Discussing slab manufacture at Maule Industries plant



Left: Three large capacity block machines with offbearers and mechanical pallet handlers. Right: Stockpiling units at the plant of Maule Industries, Inc.

Selling is a matter of re-education of the public and builders, he said, in order to break down old habits and prejudices in the selection of building materials. He listed the various promotional releases prepared by and available from the N.C.M.A., to assist in the total selling job. In conclusion, he said that the industry has a good and improved product, new products, new methods and the construction outlook is good. The problem is one of merchandising to capture a lucrative construction market.

Specifications

M. E. Rinker, president, Rinker Materials Corp., West Palm Beach, Fla., presided over the closing session which started with a concrete masonry construction clinic led by B. W. Sills, Miami Beach building inspector.

Mr. Sills, who wrote the Miami Beach building code in 1941, discussed the specifications and construction methods in use. Concrete is by far in greatest favor because of the availability of suitable aggregates and because of its good performance. Resistance to fire and high winds are also important factors.

A consistent pattern of construction is followed and, with the exception of some residences of frame construction, the remainder is of concrete. If a building exceeds three floors in height, columns must be provided at 16-ft. spacings. In such buildings, columns and beams are designed to handle the loadings and horizontal ties are required at floors and roofs. Masonry units then form the panels but are non-loadbearing. It is common practice, in such buildings, to place the non-loadbearing wall panels before the columns and beams are in place. Fewer cases of cracks develop when this practice is followed as compared to filling in the masonry panels after the columns and beams have been placed. All tall structures, where height exceeds 1½ times the width must be designed to withstand wind loads, since the area has periodic hurricanes of tremendous wind velocities.

Winds as high as 250 m.p.h. have been experienced during these storms (1950), but no structural damage has been experienced. Main damage due to these storms has been loss of roof tile and broken windows.

The only exposed concrete masonry construction used might be in single-family residences, plaster being required for fire resistance in all other construction. Block construction as such does not meet the 4-hr. fire resistance requirement of the Underwriters' Laboratories but Miami Beach establishes a 4-hr. rating for such walls when covered with suitable plaster. The standard specification for block calls for 800 p.s.i. but 1000 p.s.i. block are specified for higher rating on some jobs. Where loadbearing walls of concrete masonry are carried to three-story height, the 8-in. thickness is standard for the entire height.

The problem of government specifications in their effects on the concrete masonry industry was the subject of a talk by D. L. Chaney, Portland Cement Association, Atlanta, Ga. Mr. Chaney's speech was excellent, and it largely concerned the rather recent requirement of the Corps of Engineers that concrete units have a moisture content not to exceed 30 percent of the maximum absorption capacity of the block. This is a far more difficult specification to meet than the 40 percent limitation of A.S.T.M. which has been in effect for many years, and it has become a cause of great concern to the industry.

Mr. Chaney started his talk by stressing the need for better quality of product generally. He cited the great increase in the volume of concrete masonry for exposed walls and the trend to the adoption of more attractive joint patterns in the past ten years as reasons for emphasis to be put on greater quality of product and workmanship. Exposed concrete masonry constuction has economic advantages which the industry has been promoting, with the result that architects are specifying more such construction. According to Mr. Chaney, the Corps of Engineers and the Navy are continually specifying more exposed masonry for barracks and other military building, and the trend is increasing in other defense plant building.

With prosperity there came problems, he said, some of which have serious implications unless constructive action be taken to overcome them. The prevention of wall cracking is by far the most serious problem to be met and is a more serious challenge than all other complaints together. As a result of wall-cracking experience, some architects actually will refuse to use concrete masonry today where they customarily had favored the product.

The Corps of Engineers took definite steps to overcome the problem, in establishing the 30 percent moisture limitation in 1950, and that specification is now being enforced. Mr. Chaney said that this stipulation must be taken seriously, for if the Corps of Engineers should bar concrete masonry for future structures, a precedent would be established which would adversely influence other agencies, architects and builders.

Aside from the moisture limitation, the Corps of Engineers has adopted other requirements which are important. They include items on design and construction details, on control joints, bond beams and mortar joints which largely concern the builders. The ⅜-in. mortar joint requirement is stiff, Mr. Chaney said, but makes for attractiveness and is in the interest of the concrete masonry industry. It requires a uniform sized block with straight and true edges which makes it undesirable to use worn mold boxes and requires more careful handling throughout manufacture and on the job.

Mr. Chaney covered the 30 percent moisture content provision in great detail, and directed his discussion to the answering of the main questions in the minds of the industry. Among those questions are: (1) why was the 30 percent figure established; (2) is it being enforced; (3) does it eliminate cracking; (4) is it practical to achieve; (5) what are the production problems in meeting the requirement; (6) what is the best method for drying units; (7) what is the cost; (8) whose responsibility is it to keep the

Concrete block plant of Maule Industries which was inspected by convention visitors

units dry on the job; and (9) are there other causes for wall cracking in addition to shrinkage?

The 30 percent limitation was established as an attempt at improved performance, it having been definitely established that volume change because of moisture content was responsible for much of the cracking of concrete masonry walls. Studies indicated that much of the potential shrinkage takes place in the range of 40 percent contained moisture down to attainment of equilibrium with the relative humidity of the surrounding air.

The Corps of Engineers is enforcing the specification and some private architects are insisting on such units. There is likelihood that other groups may follow.

As to whether the 30 percent moisture content restriction will eliminate cracking, Mr. Chaney said the answer is "no," partly because other factors including settlement, etc., also cause wall cracking. However, the 30 percent moisture restriction will have the effect of reducing the size and amount of cracking, in many cases to the point where they will no longer be considered objectionable.

Mr. Chaney recently inspected structures in company with U.S. engineers which showed cracking to be small and inconspicuous. The laying of units in a dry condition had obviously helped and the engineers were satisfied on these jobs.

As to whether or not the 30 percent moisture limit is proper, Mr. Chaney said that it was effective in improved wall performance but some thought may be given to lowering the requirement still further. He mentioned a study he had made covering the shrinkage for a 100-ft. wall, based on a 100 percent shrinkage factor down to a balance with relative humidity of the surrounding air. Very little shrinkage, about 1/10 of 1 percent, took place in bringing the wall from 100 percent absorption down to 40 percent. Drying the wall down to equilibrium at 75 percent relative humidity resulted in shrinkage of ⅜ in. Carrying it further, to equilibrium at 50 percent relative humidity, another ¼ in. of shrinkage took place. Thus, it was proved that the shrinkage problem begins at the 40 percent moisture figure. The units contained 20 percent moisture when in equilibrium at 75 percent relative humidity and only 15 percent when in equilibrium at 50 percent relative humidity.

As to whether the concrete block manufacturer can deliver a 30 percent moisture unit, Mr. Chaney said the answer is "yes" and that many are doing it now. In its effects on production, added steps are required. It might involve accelerated drying by forcing dry, heated air through the block, the use of covered storage with necessary extra handling and the use of tarpaulins where trucks deliver during rainy weather.

As to practical production aspects, longer time in yard storage may prove desirable, which would require larger yard area and a large investment in inventory. It would also require willpower, he said, in order not to ship units prematurely.

This method is not necessarily the most practical or cheapest, he said, and it may prove wise to adopt a system of accelerated drying for maximum speed and best utilization of space. Among methods employed are the use of portable drying units for heat application in the kilns, the use of movable tarpaulins while drying, and more emphasis on proper cubing and stacking for maximum air circulation.

In Mr. Chaney's opinion, the most economical method to meet the specification likely would be more adequate yard storage supplemented by forced air drying. As to added cost in meeting the 30 percent moisture limitation, it might be about 1 cent per unit during the summer and 1½ cents during the winter. While it is the builder's responsibility that block be kept dry at the construction site, the concrete masonry industry must be interested and has a moral obligation to try to see that good practices are followed. This might involve the use of tarpaulins or other protection and, wherever possible, storage of units within the structure being built.

It is necessary, said Mr. Chaney, to stack units on timbers laid on the ground to keep ground water out and to prevent staining from mud splashing. Whereas settlement and poor framing are structural problems, the block producer has a moral responsibility to advise the contractor of needed precautions.

While many architects and builders have a good appreciation of concrete masonry and its low cost, Mr. Chaney cautioned that there are other criteria, among them good appearance and freedom from cracking. While it will cost more to deliver a low moisture content block, he believes that such a unit commands a proportionately higher price which the buyer will be willing to pay if he knows the reason for a premium price. It was suggested that two classes of units be produced. The one would be the premium product, to be recommended where needed, and delivered and handled under controlled conditions. The second would be for use in backup and other applications where moisture content is not so important.

In conclusion, Mr. Chaney said that the new low-moisture content specifications, while presenting production problems, represent a progressive step and, if properly handled and sold, will benefit the industry.

Association Activity

Following Mr. Chaney's talk, chairman Rinker announced the formation of the new Southeastern Regional Association, and officers and directors were elected.

E. W. Dienhart, executive secretary, National Concrete Masonry Association, in his report, said that the formation of the new southeastern association was heartily endorsed by N.C.M.A. He commented briefly on the benefits of organized association activity, telling of the growth and accomplishments of the national organization since it was founded ten years ago. The industry had to establish its identity in dealing with government regulations and in meeting a host of problems at the time. Membership was 118 after one year and it has since grown to exceed 500.

As an example of the rapid growth, he briefly summarized some of the accomplishments of the organization and detailed how the staff had been enlarged at the Chicago headquarters. During the second year, engineering director R. E. Copeland was appointed, then came W. P. Markert, director of promotion, assistance for Mr. Copeland and, recently, a Washington office was established.

Mr. Dienhart mentioned how the board of directors of N.C.M.A. has considered ways and means of cooperating with local, state and regional groups in order better to serve the entire industry. A committee on regional associations, of N.C.M.A., has already gone on record with a proposal that the national office give aid to local groups where already established or where groups desire to become organized. Under this proposal, prospective members would first

belong to N.C.M.A. but the regional group would be self-supporting. Activities of these regional organizations would supplement the work carried out by the national organization for the benefit of the entire industry and such local groups would be tied in by name with N.C.M.A.

Mr. Dienhart concluded with a few remarks on the coming annual convention and exposition of N.C.M.A. to be held in Cleveland, Ohio, January 26-29, 1953.

Final speaker on the program was A. G. Streblow, president of N.C.M.A. Mr. Streblow is a great believer in the future of the industry and its products, and he said that there is no reason why the industry should have an inferiority complex now that it has grown big and made so much progress. He was impressed with the talk by Mr. Chaney on government specifications, and expressed his accord that the industry accept the responsibilities and take necessary steps to meet such challenges.

Mr. Streblow touched upon growth of the industry and his own experiences since he started in the concrete masonry business in 1936. At that time, brick and frame were the established building materials in his area. His start in the business originated from a discovery of pumice on his property but only tamper machines were available on the market which were not applicable to pumice lightweight aggregate. He made a trip to Germany and brought back a machine for the purpose, in order to get started.

Much of the credit for the development of the industry was given those who developed high capacity machinery which would produce quality units at a low price. The development of such machinery gave the impetus for large capacity plants and a successful, well-established industry. The concrete masonry industry has made far greater progress than other suppliers of prime building materials, he said, in meeting the national challenge of an accelerated building program.

While new business was responsible for growth, it amounted, basically, to taking business away from the clay products industry, which could not readily lend itself to mechanization. The manufacturers of clay products machinery did not keep pace with the needs.

Mr. Streblow warned that it would be serious if the Corps of Engineers should discontinue the use of concrete masonry for failure of the industry to meet the wall-cracking problem. Clay products incidentally have no shrinkage problem. It is in meeting problems like this, which prove the value of strong national organizations like the P.C.A. and N.C.M.A., he said. Without such organizations, excesses against the industry might not be prevented and the industry's products likely would not have been used for government buildings at all which would have been far worse than being compelled to meet the new moisture requirement of the Corps of Engineers.

Mr. Streblow said that formation of the new southeastern regional association is a step in the evolution of the industry. He believes that two things should come to pass soon and believes that they will. One is that the industry will see fit to spend several hundred thousand dollars more on national advertising than the entire present budget of N.C.M.A. Such expenditures now are far too little based on volume of business, in his opinion. His second wish is that regional offices be set up over the nation along the lines of the P.C.A., but financed locally. With a constantly improved product and an outstanding job of promotion carried down into the regional territories, he sees no limit to the industry's potential progress.

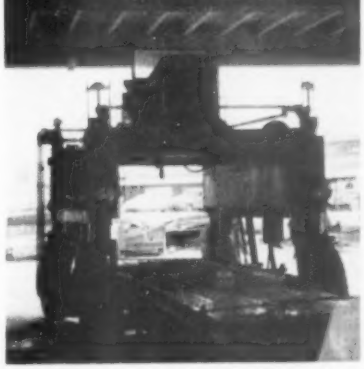
Field Trips

Local producers furnished transportation for those who wished to visit local concrete products plants following the business meetings. Probably of most interest was the large volume production in some of the plants and certain special slabs and shapes that were being made to meet particular job requirements such as building fronts.

Entertainment

While the business sessions were outstanding, there was no neglect of the entertainment side. The program committee had arranged an excellent schedule of activities. A water show and cocktail party was sponsored as one evening event through courtesy of the Miami concrete products manufacturers. One afternoon was set aside for a two-hour trip by sightseeing boat on Indian Creek, when producers and their wives were privileged to see many of the extraordinary homes and other buildings in Miami Beach.

Other scheduled events were the banquet and floor show and a luncheon address by Vash Young, internationally known author, philosopher and lecturer. Mr. Young's talk was of an inspiring nature entitled "Be Good to Yourself," which had as its theme a philosophy on how to overcome obstacles and have peace of mind.



Straddle carrier for handling concrete joists

In addition to scheduled events, General Portland Cement Co. was host at a cocktail party and those who wished took in the swimming and fishing for which Miami Beach is famous. Golf was made available through courtesy of the City of Miami Beach. Most of the delegates to the meeting came early or stayed over to swim or fish and to make trips to the Florida Keys, Cuba and Nassau.

The program committee consisted of Paul Anderson, Maule Industries, Inc., Miami Beach; Leon K. Camp, Columbus, Ga.; William R. Ireland, Atlanta, Ga.; Neil Jones, Florida Portland Cement Co., Miami; George Katterjohn, Paducah, Ky.; Lewis Lloyd, New Orleans, La.; Harry Magrath, Lehigh Portland Cement Co., Jacksonville, Fla.; Major Orovitz, Miami Beach, Fla.; M. E. Rinker, West Palm Beach, Fla.; and Carroll Strohm, Nashville, Tenn.

Registration

Adams, R. D., Adams Concrete Products Co., Durham, N.C.
Anderson, F. Paul, Maule Industries, Inc., Miami, Fla.
Anderson, Mr. and Mrs. Robert A., Crown Sidewalk Co., Minneapolis, Minn.
Andrews, B. G., N. C. Products Corp., Raleigh, N.C.
Apgar, T. K., Florida Crushed Stone Co., Ocala, Fla.
Avery, William M., Sr., Pit & Quarry Publications, Chicago, Ill.
Bacon, Dee, Florida Division, General Portland Cement Co., Tampa, Fla.
Badgett, Mr. and Mrs. L. J., Badgett Concrete Products, Mt. Airy, N.C.
Bailey, Mr. and Mrs. Sam M., Jackson Stone Co., Jackson, Miss.
Baker, R. H., Penn-Dixie Cement Corp., Chattanooga, Tenn.
Barnes, E. M., Knox Concrete Products, Inc., Knoxville, Tenn.
Bean, W. J., Albany Concrete Products Co., Albany, Ga.
Bennett, G. D., Tidewater Concrete Block and Pipe Co., Charleston, S.C.
Bennett, Jack, Tidewater Concrete Block and Pipe Co., Charleston, S.C.
Bennett, Jim, Rinker Materials Corp., West Palm Beach, Fla.
Bichutoff, R. N., Albany Concrete Products Co., Albany, Ga.
Bremer, Herb, National Cement Co., Atlanta, Ga.
Bruck, George Wm., Geist Coal and Supply Co., Cleveland, Ohio
Buchner, Otto, Buchner Cinder Block Co., Salt Lake City, Utah
Buchmaster, F. M., Maule Industries, Inc., Miami, Fla.
Burke, Kelley H., Smith-Kelly Supply Co., Inc., Mobile, Ala.
Bush, Don, Bergen Machine and Tool Co., Nutley, N.J.
Bush, Mr. and Mrs. Horace W., Multiplex Concrete Co., East Orange, N.J.
Bush, John, Bergen Machine and Tool Co., Nutley, N.J.
Cain, Walter B., Birmingham Slag Co., Birmingham, Ala.
Caldwell, D. C., Lehigh Portland Cement Co., Jacksonville, Fla.
Caldwell, J. C., Greenville Concrete Co., Greenville, S.C.
Camp, Mr. and Mrs. Leon K., Camp Concrete Products Co., Columbus, Ga.
Carney, Mr. and Mrs. M. T., Colorado Duntile Products Co., Denver, Colo.
Chaney, D. L., Portland Cement Association, Atlanta, Ga.
Chase, Allen M., Princeton, Fla.
Christy, F. L., Marietta Concrete Corp., Marietta, Ohio
Christy, R. Neil, Marietta Concrete Corp., Marietta, Ohio
Christy, Robert V., Marietta Concrete Corp., Marietta, Ohio

(Continued on page 262)

NEW MACHINERY

Lift Truck

HYSTER CO., 2902 N.E. Clackamas St., Portland 8, Ore., has available the free-lift upright for its Model 20 lift truck which is able to elevate the load without an increase in over-all height. It is designed for application where there is a minimum overhead

Free-lift uprights mounted on lift truck

clearance, and where the inner upright of a standard model would strike obstructions before the load could be elevated to the desired stacking height. Free-lift upright assemblies are available in 7 ft. 8 in. and 9 ft. 8 in. lift heights. Uprights are also available on special order in lifts higher than 9 ft. 8 in.

Material Estimator

NEW-ERA PRODUCTS, 6 Peter Cooper Road, New York 10, N.Y., has announced a combination slide rule and scale with no moving parts called the "space-scale." Made of 5- x 5-in. transparent vinylite, it is printed in two colors and laminated. It operates by placing over drawing of space to be measured and reading figure on curve. It is adaptable for use on any fractional inch scale drawing. It measures circles and cylinders and gives volume if the third dimension is known.

Fork-Lift Truck

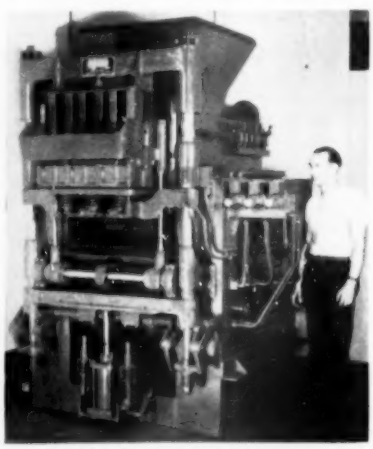
CLARK EQUIPMENT CO., Industrial Truck Division, Battle Creek, Mich., has announced the Yardlift "20", pneumatic-tired fork lift truck of 2000 lb. capacity. Twin double-acting tilt cylinders replace the single cylinder formerly used. The truck features honed cylinder surfaces, piston-type construction and rods protected by rubber dust boots. The instrument panel includes all recording dials, ignition switch and starter button. The Elliott-type steering axle, standard in the manufacturer's larger fork trucks, is incorporated in this model. The axle is pivoted in rubber torsional bearings to minimize road shock and at the truck frame center to permit constant wheel contact during travel over uneven surfaces. Over-all length less fork is 72⅝ in. and width is 34⅝ in.

Water-Repellent Coating

A. C. HORN CO., INC., Long Island City 1, N.Y., has developed a clear water-repellent coating, Dehydratine No. 22, which contains polysiloxane resins (silicones) which operate on the principle of negative capillarity. This term refers to a condition whereby a capillary tube, lined with a non-wettable material, offers strong resistance to the passage of water. When treated with the coating, pores of concrete, stucco and masonry are claimed to become effectively water repellent. It is applied by brush or spray after defective joints have been repaired and consolidated. According to the manufacturer, it then repels water, minimizes efflorescence while allowing the masonry to "breathe." It is acid and alkali resistant.

Automatic Concrete Block Machine

COLUMBIA MACHINE WORKS, 107 S. Grand Ave., Vancouver, Wash., has

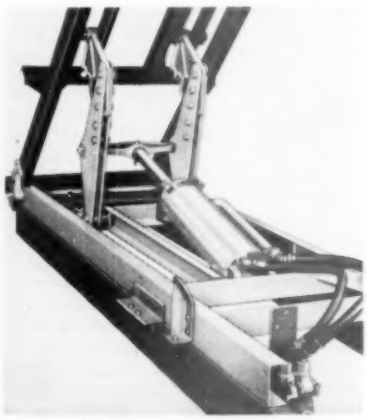


Three-block automatic block machine

produced its first three-block fully automatic concrete block machine. The machine, designated the Model 12, will produce three standard 8- x 8- x 16-in. block at a rate in excess of four cycles per minute. It occupies 96 sq. ft. of floor space and is equipped for automatic pallet feeding. It also has automatic offbearing and height control to produce block for cut stone effects and employs an unlimited variety of molds capable of being changed in 20 min. Normal operation of the machine is fully automatic, but it can also be controlled manually if desired.

Hydraulic Hoist

THE GALION ALLSTEEL BODY CO., Galion, Ohio, has announced its model 770 hydraulic hoist which has been



Redesigned hydraulic hoist

redesigned to make it suitable for installation in a wider range of motor trucks. The hoist has a load capacity of 10 to 13 tons. It features all-steel subframe, cast steel rear hinges and a forged steel crosshead. Lift arms are made from heavy fabricated steel plate. Lift arms and cast steel lift links are both equipped with heavy-duty bronze bushings and grease fittings. The unit weighs 950 lb.

New Truck Series

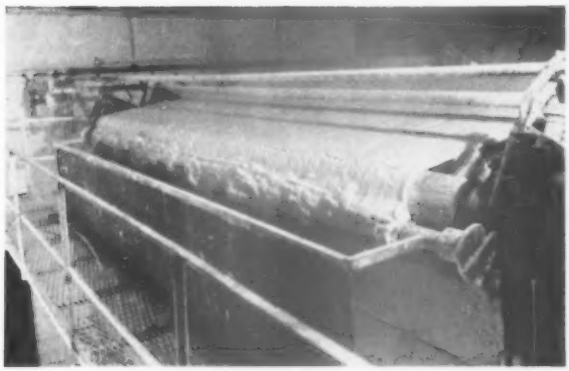
DODGE DIVISION, Chrysler Corp., Detroit 31, Mich., has announced the new B-4 series of "Job-Rated" trucks which are claimed to incorporate 50 new design features and improvements. The series includes seven engines ranging from 100 gross hp. in the ½ ton model to 171 gross hp. in the 4 ton models; gross vehicle weights range from 4250 to 40,000 lb. and gross combination weights range up to 60,000 lb. The company has introduced three entirely new engines and increased power output on ½-, ¾-, 1½-, 2-, 2½-, and 4-ton trucks.

Three-ton model in the new B-4 truck series

Exhaust valves of the 251 cu. in. engine are of silichrome steel.

A new ½-ton pick-up of 56 cu. ft. capacity with 116-in. wheelbase has been added to the new line. Gross horsepower of the 4-wheel-drive Power-Wagon and the Route-Van delivery truck both have been increased to 99. Tinted glass is available in all windows for all models.

FASTER–MORE ECONOMICAL WAY TO MAKE LIME PUTTY



Above: Discharge of Processed Lime Putty into receiving hopper. Note thickness of lime mat (1½").

Right: Coil springs on filter drum.

of Uniform High Quality

Underside of slaker, vibrating screen, and pump to filter.

NOW you can produce high-quality Lime Putty in a fraction of the time, with greatly reduced work, less ground space for equipment, and at lower cost. Two men can operate the plant.

This revolutionary new Miller-Komline Process assures uniformity of quality, and produces a cool putty ready for immediate use by plasterer or bricklayer. Lime putty of varying density can be produced according to customer requirements.

Ready-mixed Concrete Producers having surplus truck mixers can readily diversify their business, guaranteeing more continuous use of their equipment through production of ready-mixed brick mortar.

A new, revolutionary process. Differs from plants now in use in the following principal ways:

- Eliminates the large, expensive "aging" vats or tanks, along with time for cooling and dewatering the putty.
- Putty produced through this process requires no "aging." The time element is literally reduced from days to minutes.
- The putty is completely conditioned for immediate use by the mason as it leaves the machine.
- Samples of putty taken from any part of the machine are always uniform with respect to coolness and consistency.
- In the case of ready mixed mortar plants, the Miller-Komline Process can be used satisfactorily with either high calcium or dolomitic quicklime.
- Greater capacity per dollar of investment is obtained with this process over other putty plants employing the "aging" tank principle.
- It is very simple to operate. It is low cost.

EXCLUSIVE PATENT LICENSES ISSUED TO QUALIFIED PARTIES

WRITE FOR INFORMATION ON HOW THIS NEW PROCESS CAN INCREASE YOUR VOLUME AND PROFITS

SERVICE ENGINEERING CO.

HOWARD B. BISHOP, *President*

SALES ENGINEERS FOR THE MILLER–KOMLINE PROCESS

SUMMIT **NEW JERSEY**

N. C. M. A. Convention Program and Exhibits

A GUIDE to the annual meeting of the National Concrete Masonry Association, to be held in Cleveland, Ohio, January 26-29, is given here. All sessions will be held in the Cleveland Public Auditorium. The biennial Concrete Industries Exposition will occupy the main space of the Auditorium and will be open to visitors from 1-6 p.m. each day. A description of exihibits and the booth numbers follows the convention program.

Monday, January 26

A six-man panel composed of concrete block manufacturers and mason contractors will discuss mutual problems of the two groups. Members of the panel will be Ben Wilk, Standard Building Products Co., Detroit, Mich.; John L. Strandberg, Concrete Building Units Co., Kansas City, Mo.; Ralph Condo, James Condo & Son, Somerville, N.J., and three mason contractors, H. E. Nemec, Cleveland, Ohio; William Nelson, Washington, D.C.; and W. E. Tucker, Richmond, Va.

Reports by the association president, secretary-treasurer, Washington representative and executive secretary will bring up-to-date information on industry affairs.

C. A. Sirrine, executive secretary of the Concrete Products Association of Detroit, will give a report on the architect's competition for designs for small concrete masonry homes, in which $3250 was given as prizes to Michigan architects. A discussion will be held on the sponsorship of such competitions by other local groups throughout the country.

Two of the aggregate division meetings will be held on pumice and natural aggregates. In the evening will be held the customary get-together party.

Tuesday, January 27

Promotional session, under the chairmanship of Philip Paolella, is scheduled in which association activities will be described, and during which Richard Gerber, *Masonry Building Magazine*, and S. H. Westby, manager of Housing and Cement Products Bureau of the Portland Cement Association, will speak. W. P. Markert, N.C.M.A. director of promotion, will give his annual report.

Executive secretaries and presidents of local, state and regional associations will have a luncheon sponsored by the N.C.M.A.

The aggregates meetings will include Superock, Celocrete and Waylite. The annual banquet will take place in the evening.

Wednesday, January 28

Technical session will include the following papers: "Performance of Reinforced Concrete Masonry in Tehachapi Earthquake," "Evaluating Mechanical Unloading of Block from Delivery Trucks," "Utilizing Prestressed Concrete Masonry in the Design of Structural Frames of Buildings," and "What Can Be Done to Reduce the Cost of Laying Block." Paul Bronson, chairman of the technical problems committee of N.C.M.A., will preside. R. E. Copeland, director of engineering for N.C.M.A., will describe his year's activities.

Aggregates meetings will include expanded shale, Enslite, and cinder aggregates.

Thursday, January 29

Plant and production problems session will be highlighted by Cedric Willson, Texas Industries, Dallas, whose subject will be "Fundamentals of Making High Quality Concrete Masonry Units," and Edward McFaul, professional lecturer, who will suggest techniques to be used in the understanding and handling of plant personnel relationships. In addition, a special panel of ten or 12 producers will discuss many problems confronting the industry.

Adrian Peerless, Inc. **Booth 72**

Display of masonry wall reinforcement, called "Wall-Lok."

Allied Chemical & Dye Corp., Solvay Process Division **Booth 14**

Slide presentation of use of calcium chloride in concrete products.

Bergen Machine & Tool Co. **Booths 35-36**

Forney testing machine for block compression tests.

Berg Vault Co. **Booth 23**

Besser Manufacturing Co. **Booths 99-100-101-102-113-114-115-116**

Pictures demonstrating methods of minimizing or eliminating concrete block cracking; display of research equipment and block; charts and posters showing relation of relative humidity, moisture content, shrinkage and cracking and how reinforcing and control joints work; microscopic comparators with which cracks in block can be seen and measured; demonstration of new semi-automatic block splitter operated by hydraulic pressure; demonstration of advantages of new two-core block, and information on standard model block machines and other company products.

Bickerstaff, Inc. **Booth 6**

Blaw-Knox Co. **Booths 51-52-53-86-87-88**

New 5½-cu. yd. Hi-Boy truck mixer with rear engine drive; photographs of bin and batcher installations for transit mix and ready-mixed concrete operations; quick-opening door for use on high pressure steam kilns.

Wm. Bros Boiler & Manufacturing **Booths 172-173-174-175-176**

Display of new Lectro-Lift concrete block loading unit mounted on a truck.

Builders Equipment Corp. **Booth 24**

Demonstration of concrete block unloader, called the Superlite, designed to be attached to any standard flat rack truck trailer or semi-trailer.

L. Burmeister Co. **Booth 42**

Model of ready-mixed concrete plant featuring tilt-up mixer.

Burns & Russell **Booth 46**

Panel displaying smooth, tile-faced concrete block and textural units in different colors.

Butler Bin Co. **Booth 142**

Photos of installations in concrete products and ready-mixed concrete plants.

Calcium Chloride Institute **Booth 10**

Dur-O-Wal Division, Cedar Rapids Block Co. **Booth 47**

Celocrete Division, The Celotex Corp. **Booth 13**

Wall section demonstrating use of lightweight concrete units made with Celocrete; pictures will explain raw material and finished product manufacture.

Chain Belt Co. **Booths 105-106-107-108-109-110**

Rex 7-cu. yd. Adjusta-Wate Moto-Mixer with engine rear-mounted.

Cleaver-Brooks Co. **Booths 33-34**

Compact 50-hp. self-contained steam boiler for concrete block curing.

Cleveland Vibrator Co. **Booth 15**

Working models of vibrators with application in concrete products industry.

Clipper Manufacturing Co. **Booths 38-39**

Wet- and dry-types of masonry saws; newly developed break-resistant abrasive blade constructed of layers of glass and nylon fibers will be featured.

Columbia Machine Works **Booths 54-55-84-85**

New model 21 three-block, electronically controlled block machine, automatic block splitter and fully automatic two-block machine on display.

Concrete **Booth 168**

Publisher of *Concrete* magazine.

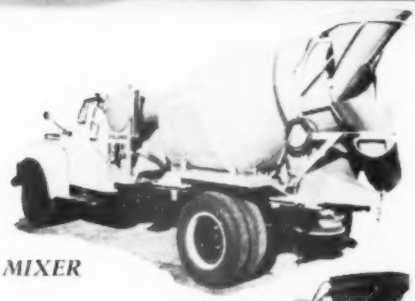
Concrete Transport Mixer Co. **Booths 1-2-3-4**

Display of full size models of Hi-Lo/Jr. and the new Rocket truck mixers.

Construction Machinery Co. **Booths 58-59-60-79-80-81**

New 4½-cu. yd. Transcrete truck mixer, and standard 3- and 5½-cu. yd. models; pictorial displays of batching

(Continued on page 256)



3 YARD MIXER

3½ YARD MIXER

The recently introduced side engine mount (right) is another "FIRST" for Challenge and is currently in production on 5, 6, & 6½ yard sizes. By placing the mixer engine to the rear at the side of the drum, the center of gravity is moved forward approximately 18 inches, moving thousands of pounds additional weight (all extra net payload) on a heavy duty front axle.

Team up with Challenge

for greater PROFIT in '53...

With the only complete line of truck mixers on the market, Challenge offers the Right Size Mixer to team up with the standard 2 or 3 axle truck of your choice. A careful analysis of Challenge sizes and their application will enable you to utilize the physical and legal capacity of mixer and truck to assure full rated capacity payloads. In addition, the use of standard industrial equipment in their manufacture keeps operating and maintenance costs to absolute minimum. You can be sure of greater profit if you team up with Challenge in '53.

4 YARD MIXER

5 YARD MIXER

6 YARD MIXER

6½ YARD MIXER

COOK BROS. TRUCK EQUIPMENT

COOK BROS.
EQUIPMENT COMPANY
1815 No. Broadway, CApitol 2-9111
Los Angeles 31, California

See the new Challenge, Booths #92, 93 & 94 Concrete Industries Exposition, Cleveland, Ohio, Jan. 26-29

Exclusive Distributors for CHALLENGE ... Standard of The Industry.

COOK BROS. EQUIPMENT CO. CP

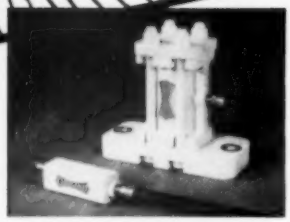
Please send detailed information on Challenge Mixer sizes, together with name and address of my nearest Challenge Dealer.

NAME_____

ADDRESS_____

CITY_____ STATE_____

THE ABC's OF KEEPING CONCRETE MATERIALS ON THE MOVE!



It's easy, and QUIET, when you use a Cleveland Air-Cushioned Vibrator, known as the Type AC.

A Arching in bins and hoppers is eliminated by the efficient action of the piston vibrating back and forth.

B Bridging of dry materials is broken up quickly and quietly on operations where noise is a factor.

C Clogged cinders, coal, cement, lime, slag, concrete, etc., break up and start moving again with no loss from down time or wear on hoppers, chutes, screens, railroad cars or bins.

It's as simple as that—and we'll gladly send a FREE engineering recommendation for your problem. This product, like the Cleveland standard metallic impact vibrator, has 27 years' air vibrator experience behind it.

BIN stuck lately?

Catalog on request or we'll be glad to hear from you in more detail.

THE CLEVELAND VIBRATOR COMPANY

2712 Clinton Ave. • Cleveland 13, Ohio

Concrete Masonry Convention Program

(Continued from page 254)

equipment, stationary mixers for central plants, masonry saws and hoisting equipment.

Cook Bros. Equipment Co. **Booths 92-93-94**

Truck-mounted Challenge mixer of newest design.

Currier's **Booth 21**

Display of precast concrete incinerators and barbecues.

Erickson Power Lift Trucks, Inc. **Booths 132-133-158-159**

New improved lift trucks, one fork-type and a platform-type.

Ferro Corp. **Booth 12**

Fleming Manufacturing Co. **Booths 89-90-125-126**

Three pieces of equipment on display: FMC-400 two-block machine; FMC-180 one-block machine and FMC-24 plant mixer.

Flexicore Co. **Booth 162**

On-the-job photographs showing Flexicore floor and roof system.

General Engines Co. **Booth 149**

Operating Rainbow Rock machine, producing slump brick.

Heltzel Steel Form and Iron Co. **Booths 103-104**

The Jaeger Machine Co. **Booths 143-144-145-146-147-148**

Main display will be 4½-cu. yd. Hi-Dump truck mixer; also small pump and mixer.

C. S. Johnson Co. **Booths 121-122-123**

Model of wide rehandling clamshell bucket on display; photographs of other concrete products plant equipment.

J. A. Jones Concrete Machinery Co. **Booth 9**

New equipment to be displayed will include continuous mixer with constant volume densifier, compression testing machine and hydraulic testing unit.

Kent Machine Co. **Booths 127-128-163-164**

New plain pallet, hydraulic, continuous automatic cycling block machine producing two 8-in. equivalents per cycle; attachments for Lintelator; brick attachments for the Blockmaker; improved cement feeder and renewable trough liners for continuous mixers.

Klingelhofer Machine Tool Co. **Booth 50**

The Knickerbocker Co., Truck-Man Division **Booths 40-41**

New 4500-lb. capacity lift truck designed for concrete products plants; model 40 high lift truck with optional number of forks; general utility mixer and a heavy-duty tilting mixer for mixing mortar and concrete.

Krete Koater Service **Booths 130-131**

Demonstration of coating machine for applying glazed or textured surfaces to concrete block, with choice of 20 colors.

Kwik-Mix Co. **Booths 121-122-123**

Moto-Bug unit will be on display, showing several improvements over last model.

Lith-I-Bar Co. **Booths 95-96-97-98-117-118-119-120**

Principal display will be new model of L-5 concrete block machine; company's L-2 concrete block machine will also be featured. Other exhibits will include new 11-ft. high air motor off-bearer; and Lith-A-Tex, a concrete facing material made on the company's splitting machine.

Littleford Bros., Inc. **Booth 91**

"Kwik-Steam" steam generator.

The Master Builders Co. **Booths 16-17-18**

Demonstration of advantages of Pozzolith concrete; abrasion tests of Masterplate concrete floors; display of Embeco Non-Shrink mortar for grouting machinery and heavy equipment.

Memphis Equipment Co. **Booth 129**

Explanation of use of surplus Army 6x6 trucks for concrete operations.

Medusa Portland Cement Co. **Booth 8**

Mingotile, Inc. **Booth 7**

Multiplex Machinery Co. **Booths 61-62-63-76-77-78**

Gene Olsen Corp. **Booths 67-68-69-70-71**

Gocorp Super-Senior plain pallet block machine and Gocorp Jr. single cored pallet block machine.

Oswalt Engineering Service Corp. **Booth 27**

Peerless Cement Corp. **Booth 20**

Pit & Quarry **Booth 11**

Publisher of *Pit & Quarry* magazine.

Portland Cement Association **Booth 28**

Arthur Rehberger & Son, Inc. **Booths 165-166-167**

Standard block unloader for mounting on tandem-axle truck and carrying eight cubes; new small unloader for carrying four cubes of block and mounted on a single-axle truck. Introducing a complete line of brick unloaders for carrying up to 10,000 brick.

Rock Products **Booth 37**

Publisher of ROCK PRODUCTS.

Shore Engineering **Booth 19**

The W. W. Sly Manufacturing Co. **Booth 124**

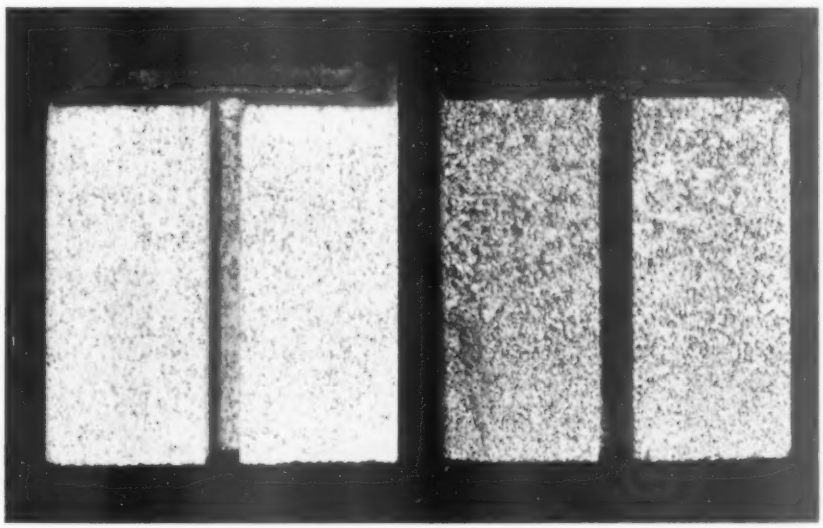
Full-size Economy dust filter for

(Continued on page 258)

Better Concrete Blocks at lower operating costs by adding economical D-40

Let us show you how we have helped other concrete products manufacturers make superior blocks and at the same time reduce operating costs.

You will experience these advantages by adding a small amount of Detergent D-40 to the dry cement or wet mix.



Block A (left) made with D-40; Block B (right) made the old way. Note difference in texture, color, appearance. Sharp edges and corners.

Better appearance—smoother, whiter, finer surfaces

Greater strength—less water produces stronger concrete

Closer bonding—saves on painting and waterproofing

Reduces abrasive wear on mixing and molding equipment

Saves time—mixes pour into molds faster—"break"cleaner

Easy to use—just add to dry cement or "mix"

Economical—D-40 costs you a fraction of a cent per block

D-40 is a granular detergent widely used in manufacturing many different molded concrete products. It is supplied in 85# bags by Oronite, the world's largest producer of synthetic detergent raw materials. Because of its qualities only one to two oz. of D-40 per bag of cement is needed to obtain outstanding results. With D-40 you are assured of a stable, economic source of supply.

Ready-mixed concrete producers have found D-40 improves their product.

For complete information, samples and technical help write or call the nearest Oronite office.

ORONITE CHEMICAL COMPANY

38 SANSOME STREET, SAN FRANCISCO 4, CALIFORNIA
30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK
STANDARD OIL BLDG., LOS ANGELES 15, CALIFORNIA
600 S. MICHIGAN AVENUE, CHICAGO 5, ILLINOIS
MERCANTILE SECURITIES BUILDING, DALLAS 1, TEXAS

ORONITE CHEMICAL COMPANY
THE NAME TO WATCH IN CHEMICALS

Stacking a stabilized load of weather-protected cans at United Can & Glass Co., Haywood, Calif.

Use your air rights...

on pier, in plant, outside or warehouse-wide . . . let Towmotor stack space-eating loads, up where you've storage capacity to spare. Speeding the handling of *all* materials, Towmotor saves its cost in a matter of months—then *you* profit by that big earning power throughout many busy years. You'll see the proof, right from the start, in stepped-up output per man-hour. Chart your course for maximum production with the help of a copy of "Man-Hour Thieves." Write for yours *now* and name of your nearest Towmotor Representative. Towmotor Corporation, Div. 4901, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS and TRACTORS
SINCE 1919
RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Convention Exhibits

(Continued from page 256)

use in ready-mixed concrete plants to reduce loss of cement dust in batching.

T. L. Smith Co. **Booths 134-135-136-155-156-157**

Split Rock Products Co. **Booth 31**

Several models of block splitting equipment, one with capacity up to 28 in. length.

Spray-O-Bond Co. **Booth 32**

Concrete plasticizer, information and uses.

Standard Dry Wall Products, Inc. **Booths 29-30**

Stearns Manufacturing Co. **Booths 169-170-171-177-178-179-180-181-182**

Towmotor Corp. **Booths 64-65-66-73-74-75**

Model LT-60 fork lift truck equipped with Schmidgall block forks, and demonstration of handling techniques.

Tracto-Lift Co. **Booths 111-112**

Heavy-duty model lift truck with "super traction" tires.

Transmission & Gear Co. **Booths 43-44-56-57-82-83**

Transo truck mixer of 6½ cu. yd. capacity, also several models of front-end loaders; a ½ cu. yd., 1¼ cu. yd. and 1½ cu. yd. four-wheel drive unit.

Truax Machine & Tool Co. **Booth 24**

Three models of block splitter; block unloader in conjunction with Builders Equipment Corp.

Universal Door Carrier, Inc. **Booths 25-26**

White Motor Co. **Booth 48**

Pictures and an industrial engine. Equipment will be mounted on White trucks in the following displays: T. L. Smith Co., Wm. Bros. Boiler and Manufacturing Co., and Concrete Transport Mixer Co.

Worthington Corp. **Booths 137-138-139-140-141-150-151-152-153-154**

New line of Hi-Up truck mixers in 3, 4½ and 5½ cu. yd. sizes, and a 56-S central mixer.

Concrete Design

WILLIAM J. ANDERSON, consulting engineer, West Hartford, Conn., published an article in the September, 1952, issue of *Public Works*, written to suggest ways to improve concrete.

The article gives a scientific analysis of the making of concrete, including information on the effects of sand bulking, water content, specific gravities of aggregates and cement, and a discussion of voids. Accompanying charts show bulking of various sands by moisture percentage, relationship of water-cement ratio to cement paste strength, and the effects of various moisture contents on the volume-weight of sand. Requests for the article should be made to the publisher of *Public Works*, 310 E. 45th St., New York, N.Y.

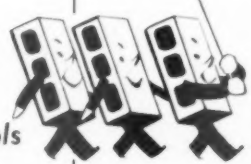
YOU ASKED FOR IT, and HERE IT IS!

THE NEW *Columbia* MODEL 12 FULLY AUTOMATIC 3 BLOCK

Here are the reasons behind *Columbia's* outstanding performance:

- ★ *Exceeds 4 cycles per min.*
- ★ *Standard plain pallet*
- ★ *Removable plunger*
- ★ *Controlled vibration*
- ★ *Hydraulically operated*
- ★ *Manual controls for clean-up*
- ★ *Automatic height control*
- ★ *Twenty-minute mold change*

These and many other features make the Columbia Model 12 an outstanding machine and a leader in its field.



Here's the answer to your demands for an automatic Columbia with 3-block capacity! The Model 12 contains the same quality features which made its predecessor machines so popular PLUS added improvements to increase your plant's output and quality to a new profit-producing high!

NATIONWIDE SALES, PARTS AND MAINTENANCE SERVICE with headquarters in the following states: Washington, California, Wisconsin, Mississippi, Florida, New Jersey, South Carolina, and Virginia. Fast service maintained to all parts of the country. Write today for additional information.

Columbia MACHINE WORKS
107 S. GRAND AVENUE • VANCOUVER, WASHINGTON

A MILLION DOLLARS WORTH OF BUSINESS
is waiting for someone in:

BOSTON
NEW YORK
PHILADELPHIA
ATLANTA
DALLAS
HOUSTON
ST. LOUIS
LOS ANGELES
SAN FRANCISCO

. . . someone who has a going organization which can meet these requirements.

1. Experience in the mass production of *concrete products.*
2. Selling experience in the *construction* field.
3. Ability to invest $150,000 in plant and equipment. High credit rating.

Those markets (and others) are waiting for Flexicore, the economical precast concrete floor and roof slab. Some organization in each of those marketing areas will get a profitable, exclusive Flexicore franchise. Perhaps it should be yours.

If so, we will help you set up your plant . . . teach your men how to manufacture and sell Flexicore . . . share a national sales promotion campaign with you.

Flexicore is now being manufactured in 16 marketing areas. Present manufacturers are grossing up to $1,000,000 *per year.* Their profit margin is good. Sales have more than doubled in the past two years, actually an increase of over 130%.

The demand for Flexicore in other areas cannot be met satisfactorily until we have manufacturers on the spot.

If your area does not have a Flexicore plant now and you can qualify, write me for more information.

FLEXICORE
Flexicore is described in Sweet's Architectural Catalog. The Flexicore Co., Inc. is a subsidiary of Price Brothers Co., an AaA1 company. Its owners have been in the concrete fabrication field for 30 years. Flexicore has been proved popular. Its big years are ahead.

Robert E. Smith, Vice President
The Flexicore Co., Inc.
Dayton 1, Ohio

BAUGHMAN
HI-SPEED JOB-FITTED Portable and Stationary
CONVEYORS
Years ahead in design and construction.
Built better to last longer!
PROMPT DELIVERY.
Write for Catalog A-339.
BAUGHMAN MFG. CO., INC.
1111 Shipman Rd.
Jerseyville, Illinois
Move MORE materials at LESS cost!
Model 230

European Developments

(Continued from page 234)

the appearance of 8- x 18-in. block. The facing also is coated with a very fine, dense cement facing material with integral color added. The block are placed one on top of the other without mortar, but a glass fiber rope is laid in a groove cast in the block. Each block has a half-core section on the vertical sides which, when placed against the adjoining block, provides a chase which is filled with a poured grout when story height is reached. The various horizontal and necessary vertical exterior joints are then simply tuck-pointed and the wall is finished. These lightweight precast block are made on the site together with the necessary beams, lintels and sills. Floors and roofs are also precast on the site, and are lifted into place by a traveling crane and quickly set in place.

The speed and ease of construction together with a very attractive architectural design makes this system a very progressive and modern method. The interiors are plastered direct to the lightweight concrete walls and, of course, the exterior walls are already finished in pleasing colors.

Perhaps the reason so many new ideas are found in Scandinavia is due to the fact that most projects are let or designed through architectural competition. Architects are invited to submit in this competition, their study and ideas to fit the suggested requirements. Owners contemplating a project thus receive many varied and unique suggestions, and even models of their proposed construction.

Europe, as a whole, is making rapid progress in building programs. Sweden has done an outstanding job, both in types as well as numbers of projects. At the present time, north of Stockholm, an apartment and business building program is under way to house 70,000 people, the buildings all built of lightweight concrete block and slabs.

Germany Has Largest Block Plant

In Germany at Frankfort Am Main, I visited a plant which is without a doubt the largest block plant in the world. Here in a new, modern plant, the rubble from the bombed and destroyed buildings of the community is reconverted to strong, economical building block to be used in the huge reconstruction program. At the site of a row of bombed-out buildings, a shovel moves in and scoops up the debris, placing it in trucks which haul the old brick, block, stone, plaster, mortar and dirt to a central unloading trap where the material is dumped into a receiver. Conveyors carry the debris and rubble to screens and crushers where the brick and stone are crushed to aggregate (⅜ in.) size for block and then moved on conveyors to storage bins. The plaster, old mortar, sand and dirt are

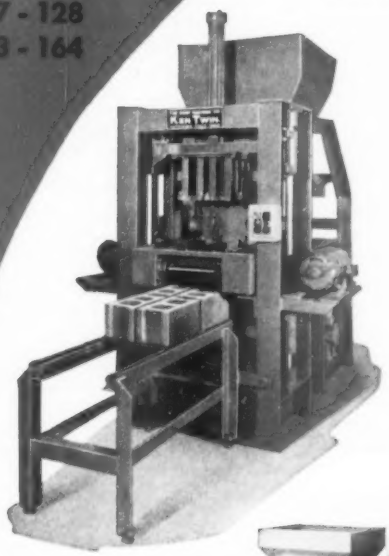
(Continued on page 262)

See New Advanced Equipment

at The **KENT** **CONCRETE INDUSTRIES EXPOSITION EXHIBIT**

PUBLIC AUDITORIUM — CLEVELAND — JAN. 26-27-28-29

BOOTHS
27 - 128
63 - 164



See the New

KENTWIN BLOCK MAKER

An Advanced and Simplified Plain Pallet Machine

A push-button controlled, hydraulically operated, automatic cycling block machine.

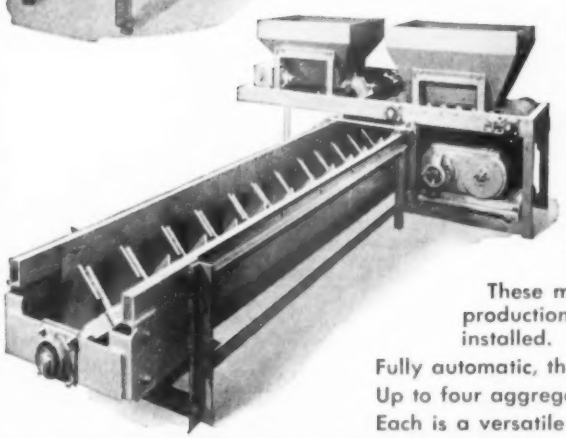
Makes two eight-inch blocks or equivalent; or brick, each cycle.

Embodies synchronized dual motor vibration and positive height control. Automatic pallet return available.

A compact machine combining exceptional accessibility with fast, easy mold changing.

Ruggedness, simplicity, anti-friction bearings assure smooth operation and long life with low maintenance cost.

See this machine. Study it. Ask questions. Then arrange for early installation and a new and satisfactory experience in block making.



See KENT Standard & Duplex BLOCKMAKERS

The Standard is a semi-automatic machine that produces 5 to 6 smooth topped blocks per minute from any aggregate at a low cost per block.

The DUPLEX is similar in design and operation—a machine that produces two 8" blocks at each cycle.

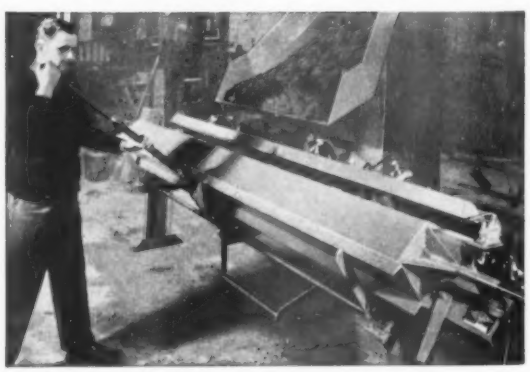
See KENT *Continuous* MIXERS

These machines, now available in several sizes and capacities, step up production, eliminate production problems and increase profits wherever installed.

Fully automatic, the operator Sets it—Starts it and Leaves it to attend to other duties.

Up to four aggregates can be fed with the proportion of each accurately controlled.

Each is a versatile machine since the number of paddles, their angle and position on the shaft are all variable—also the cycle of mixing and length of time the aggregate is retained is variable up to 12 minutes.



See the Versatile KENT LINTELATOR

This exclusive KENT machine has taken the industry by storm since it produces better lintels, sills, etc., faster and more economically than by any other process.

AND IT OPENS A NEW MARKET FOR PROFITABLE SALES.

Sizes are available for making all practical sizes of lintels.

If you haven't yet installed your first LINTELATOR you're missing a good bet.

The KENT MACHINE COMPANY

CUYAHOGA FALLS, OHIO, U.S.A.

Manufacturers of **CONCRETE PRODUCTS MACHINERY** *Since 1925*

For Relaxation and Refreshment YOU'RE INVITED to Suite 815 Auditorium Hotel (directly across from the Exhibit Hall)

MAXIMUM efficiency
MINIMUM investment

MIX ON-THE-JOB with the
WILLARD "TASK FORCE"

WILLARD
Weigh-Batch Loader

WILLARD
Mixer Loading Conveyor

WILLARD Truck Mixer

GET MORE DONE with less expense with Willard portables like the typical company shown above. Their fast-operating spread consists of self-loading Weigh-Batcher, Mixer Loading Conveyor and two Truck Mixers . . . all bought for a fraction of the cost of a big stationary plant. Only two drivers, a batcher man and a dispatcher are needed.

You take Willards right to the project for maximum efficiency . . . using multiple stock piled aggregates and bulk cement for specification concrete. Moving to a new location requires no effort beyond digging a shallow pit for the foot of the conveyor. The "Willard Way" is the time-saving way!

"Wheel the right mix at the right time at the right cost to the right place with Willards."

WRITE FOR THE "WILLARD WAY" BOOKLET

Manufactured in Galion, Ohio and Los Angeles

WILLARD CONCRETE MACHINERY SALES CO.
11700 WRIGHT ROAD, LYNWOOD (LOS ANGELES COUNTY), CALIF.

READY MIX *"the Willard Way"*

GREATER READER SERVICE MAKES ROCK PRODUCTS THE FAVORITE PUBLICATION OF YOUR INDUSTRY

Nearly 17,000 men in the industry subscribe to Rock Products.

Why? . . . Because Rock Products helps these men, month by month, do a better, more economical, more profitable job. Such regular features as *Hints and Helps, Association News, News of the Industry,* as well as complete, full-length features on the industry's newest, most modern plants make Rock Products the favorite of the industry . . . every month.

Join this family of progressive, industry leaders today by sending your subscription order . . .

Two years, $3
One year, $2

Rock Products
309 West Jackson Blvd.
Chicago 6, Ill.

European Developments

(Continued from page 260)

separated and mixed with a powdered coal, and then conveyed through a very large sintering furnace by means of a traveling grate. The sintered material is crushed and mixed with the crushed brick and stone to which cement is added to form a dry block mix. After thorough mixing in pan-type mixers, the material is dropped into a fully automatic, German-designed block machine, making eight block at a time and delivering the pallet with the block on a traveling rope conveyor system to the storage yards. A battery of these block machines turns out literally acres of block each day. After the block have been cured in the stockpiles, they are in many cases delivered right back to the site from which the debris and rubble came. Beautiful new buildings and apartments are being built from reclaimed material and at very economical prices. The plant, I understand, is owned by the city of Frankfort.

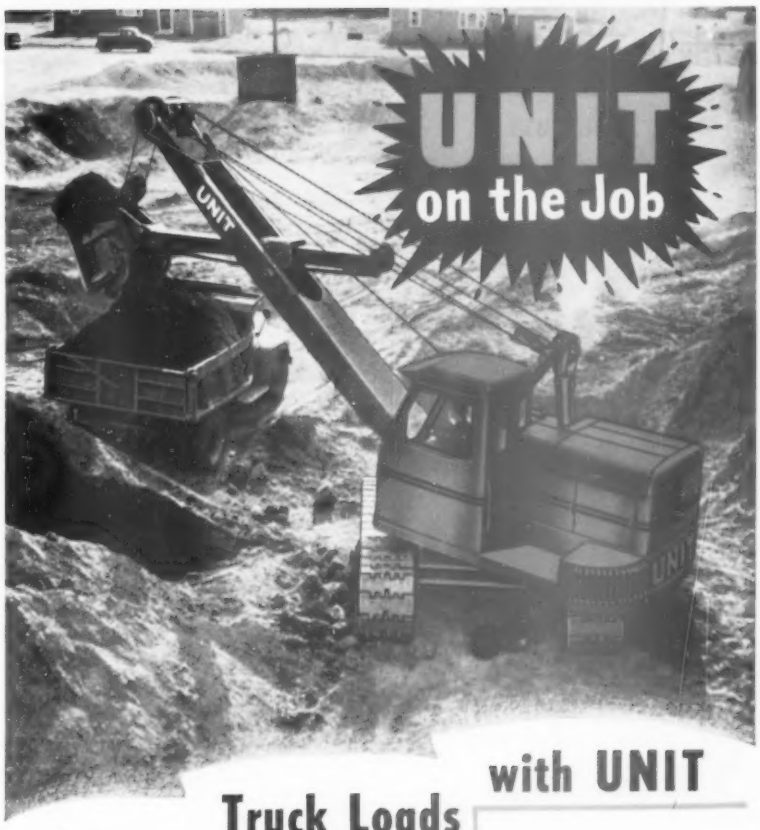
Southeastern Meeting

(Continued from page 251)

Church, Alden F., Universal Atlas Cement Co., Miami, Fla.
Clark, A. J., Texas Industries, Inc., Dallas, Texas
Coffey, F. G., Smith-Kelly Supply Co., Mobile, Ala.
Cook, Hal A., Signal Mountain Division, General Portland Cement Co., Atlanta, Ga.
Cooper, Wert W., Concrete Products Co., Clarkdale, Miss.
Cranford, Mr. and Mrs. Charles H., Superock Co., Birmingham, Ala.
Darden, Mr. and Mrs. Roy, Roy Darden Industries, Inc., Atlanta, Ga.
DeMarco, Mr. and Mrs. J. A., DeMarco Block Co., Birmingham, Ala.
Dennis, Hall, Wilson Concrete Products, Riviera Beach, Fla.
Dienhart, Mr. and Mrs. E. W., National Concrete Masonry Association, Chicago, Ill.
Disk, J. G., Medusa Portland Cement Co., Ft. Lauderdale, Fla.
Donihee, "Til", Fleming Mfg. Co., Cuba, Mo.
Edgar, Floyd, Edgar Bros. Concrete Products, Daytona Beach, Fla.
Edgar, Freddie, Edgar Bros. Concrete Products, Daytona Beach, Fla.
Eger, O. D., Eger Concrete Co., Inc., Auburndale, Fla.
Ehle, Mr. and Mrs. Jay E., Cleveland Builders Supply Co., Cleveland, Ohio
Elliott, Mr. and Mrs. Frank W., Muscogee Concrete Products, Inc., Columbus, Ga.
Fitz, Mr. and Mrs. H. Varsion, Alpha Portland Cement Co., Birmingham, Ala.
Fleming, Mr. and Mrs. Harvey E., Atlanta Aggregate Co., Atlanta, Ga.
Fleming, Mr. and Mrs. T. H., Fleming Mfg. Co., Cuba, Mo.
Fonatine, Robert A. Jr., General Portland Cement Co., Ft. Lauderdale, Fla.
Ford, A. Cabell, "Solite Corp", Southern Lightweight Aggregate Corp., Richmond, Va.
Foster, F. K., Maule Industries, Inc., Miami, Fla.
Foster, W. A., Palmetto Quarries Co., Columbia, S.C.
Frank, Harry M., Atlas Building Products Co., El Paso, Texas
Franklin, Jack, Besser Mfg. Co., New York, N.Y.
Friedman, Mr. and Mrs. Harold F., Glynn Construction Co., Brunswick, Ga.
Gale, Ben P., Wilson Concrete Products, Inc., Riviera Beach, Fla.
Gall, Walter, Standard Sand and Silica Co., Davenport, Fla.
Garvin, W. D., Lehigh Portland Cement Co., Birmingham, Ala.
Geist, Herbert F., Geist Coal and Supply Co., Cleveland, Ohio
Geiss, W. W., Gillis Block and Supply Co., Ft. Lauderdale, Fla.
Goetz, Mrs. George, Clifton Concrete-Ft. Myers Concrete, Ft. Myers, Fla.
Giaimo, Mr. and Mrs. Charles F., Multiple Concrete Co., Inc., E. Orange, N.J.
Gay, Mr. and Mrs. Allen T., Binker Material Corp., West Palm Beach, Fla.

Grogan, Robert D., Jr., Superior Block Co., Charlotte, N.C.
Hanson, Donald L., Hanson, Wood & Hoel Industries, Inc., Tallahassee, Fla.
Harrell, G. H., Alabama Cement Tile Co., Birmingham, Ala.
Hart, Mr. and Mrs. J. L., Tampa, Fla.
Hickman, Rush S., Signal Mountain Division, General Portland Cement Co., Chattanooga, Tenn.
Holloway, John P., Shands & Baker, Jacksonville, Fla.
Holmes, T. A., Tifton Brick and Block Co., Tifton, Ga.
Holt, F. H., Superock Co., Birmingham, Ala.
Hultmark, Myron, Stearns Mfg. Co., Adrian, Mich.
Hurst, E. G., Kem-Krete Service, Hillsboro, Ill.
Ireland, Mr. and Mrs. C. W., Birmingham Slag Co., Birmingham, Ala.
Ireland, Mr. and Mrs. William R., Atlanta Aggregate Co., Inc., Atlanta, Ga.
Jacobs, A., Lith-I-Bar Co., Holland, Mich.
Jahncke, Herbert, Jahncke Service, Inc., New Orleans, La.
Jones, Neil, Florida Cement Co., Miami, Fla.
Katterjohn, Mr. and Mrs. George W., Katterjohn Concrete Products, Paducah, Ky.
Kelly, Mr. and Mrs. John E., Smith Concrete Co., Kinston, N.C.
Kennedy, Mr. and Mrs. R. J., Jr., Ken Block Co., Savannah, Ga.
Kerr, R. C., Tidewater Concrete Block and Pipe Co., Charleston, S.C.
Kerr, Ken, Butler Bin Co., Waukesha, Wis.
Kincaid, W. F., Brikcrete, Inc., Tampa, Fla.
Klemens, Paul, Columbia Machine Works, Vancouver, Wash.
Knighton, James A., Knighton Franchise Distributing Co., Birmingham, Ala.
Lamkin, Clyde, Peninsula Block Corp., Hampton, Va.
Ledford, Mr. and Mrs. M. F., Stearns Mfg. Co., Inc., Adrian, Mich.
Leftwich, R. F., New York, N.Y.
Levine, Sam, Samson Block Co., Miami, Fla.
Lisovsky, Fred, Besser Mfg. Co., Acrow division, Alpena, Mich.
Livesay, Everett G., Livesay Industries, Coral Gables, Fla.
Lloyd, A. E., Alabama Cement Tile Co., Birmingham, Ala.
Lloyd, Mr. and Mrs. Lewis, Alatex Construction Service, Inc., New Orleans, La.
Liutes, Harold C., Layrite Concrete Products Co., Spokane, Wash.
Magrath, Hardy, Lehigh Portland Cement Co., Jacksonville, Fla.
Maples, James N., Richmond Concrete Products Co., Augusta, Ga.
Marbury, J. G., Albany Concrete Products Co., Albany, Ga.
Markert, William P., National Concrete Masonry Association, Chicago, Ill.
Marsey, Mr. and Mrs. T. H., Marsey Concrete Co., Gainesville, Ga.
Martin, R. C., R. C. Martin Concrete, Inc., Sarasota, Fla.
Matthews, Coke S., Jr., Lone Star Cement Corp., Birmingham, Ala.
Maxwell, Homer, Roy Darden Industries, Inc., Atlanta, Ga.
McDargh, H. J., Portland Cement Association, Atlanta, Ga.
McDonald, Mr. and Mrs. J. Harry, Penn-Dixie Cement Corp., Atlanta, Ga.
McDowell, S. A., Macon Brick and Block Co., Macon, Ga.
McGee, Mr. and Mrs. H. A., Jr., Farmers Concrete Products, Inc., Orangeburg, S.C.
McIntyre, Archie, Besser Mfg. Co., Decatur, Ga.
Millhouse, Roy, Universal Atlas Cement Co., Birmingham, Ala.
Mitchell, Harry, Portland Cement Association, Atlanta, Ga.
Mitchell, Mr. and Mrs. R. W., Burton Block Co., Beaufort, S.C.
Mitts, Keyes, Universal Atlas Cement Co., Birmingham, Ala.
Moody, Mr. and Mrs. G. D., Stearns Mfg. Co., Bristol, Va.
Moora, B. P., Southern Cement Co., Birmingham, Ala.
Moore, Mr. and Mrs. A. F., Penn-Dixie Cement Corp., New York, N.Y.
Murphy, Richard R., Radcliff Gravel Co., Inc., Mobile, Ala.
Needham, Mr. and Mrs. C. I., Aquatile Tile Co., Bradenton, Fla.
Neth, Walter, Columbia Machine Works, Vancouver, Wash.
Nettles, Mr. and Mrs. George E., Florida Division, General Portland Cement Co., Miami, Fla.
Nordberg, Mr. and Mrs. B., Rock Products and Concrete Products, Chicago, Ill.
Odum, Mr. and Mrs., Odum Lumber Co., Birmingham, Ala.
Olsen, Mr. and Mrs. Gene D., Gocorp, Adrian, Mich.
Orovitz, M. M., Alfred Destin Co., Miami Beach, Fla.
Oswalt, Mr. and Mrs. George L., Oswalt Engineering Service Corp., Forest Park, Ill.

(Continued on page 264)

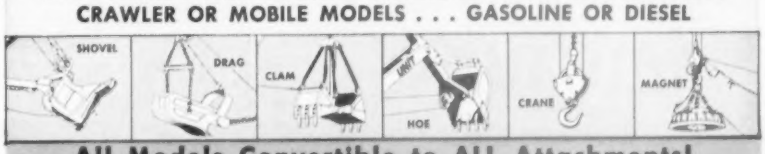


Step-up Truck Loads with UNIT

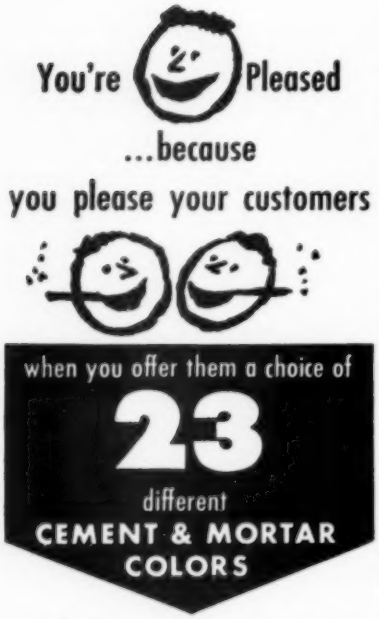
Here's a UNIT ¾ yard Shovel that's "in there swinging" . . . making big payloads. UNIT'S balanced stability and power permit hard digging . . . produce maximum yardage at low operating cost. Fewer working parts cut down replacements required . . . reduce maintenance costs. The FULL VISION CAB enables operator to see in ALL directions . . . promotes safety . . . increases efficiency. Results in more loads per day and easier load handling. Get the complete UNIT story. Write for literature.

UNIT CRANE & SHOVEL CORPORATION
6431 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

½ or ¾ YARD EXCAVATORS...CRANES UP TO 20 TONS CAPACITY
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL



All Models Convertible to ALL Attachments!



Made by Williams, this is the broadest selection of fine Cement and Mortar colors on the market. By offering your customers a choice of 23 shades, you can quickly and easily settle upon one having the exact chemical and physical properties your color specification requires.

Cement Colors by Williams

Here you have a choice of 18 shades—6 Reds, 3 Greens, 3 Browns, 3 Yellows, 1 Black, 1 Blue, and 1 Orange. Each shade is manufactured to meet the most exacting specifications for cement work—as recommended by the American Concrete Institute and the Portland Cement Association.

Mortar Colors by Williams

Here you have a choice of 5 different shades—one shade in double strength red, light buff, dark buff, chocolate and black. Each of these colors may be used with excellent results with any standard mortar mix or with a ready-made Bricklayer's Cement.

Write today for color samples and complete technical information on how Williams Cement and Mortar Colors give you superior results. Address Dept. 10, C. K. Williams & Co., Easton, Pennsylvania.

WILLIAMS
COLORS & PIGMENTS

C. K. WILLIAMS & CO.
East St. Louis, Ill. Easton, Pa. Emeryville, Cal.

Southeastern Meeting

(Continued from page 263)

Oswalt, Mr. and Mrs. William, The Oswalt Co., Forest Park, Ill.
Pafford, T. M., Ramsey Bros., Miami, Fla.
Page, Mr. and Mrs. R. C., Page-Groves Co., Lefington, Ky.
Paturzo, Mr. and Mrs. S., V. Paturzo Bro. & Son, Inc., Baltimore, Md.
Peeples, Gus., Rinker, Inc., Ft. Pierce, Fla.
Pennell, J. Roy, Spartanburg, S.C.
Perkerson, L. N., Besser Mfg. Co., Atlanta, Ga.
Pommer, Mr. and Mrs. H. O., John A. Denies Sons Co., Memphis, Tenn.
Porter, J. O., Sarasota Concrete Co., Sarasota, Fla.
Posey, Milton E., Atlanta Aggregate Co., Atlanta, Ga.
Probest, Mr. and Mrs. R. A., The Oswalt Co., Forest Park, Ill.
Quaritius, Henry, Nailable Cinder Block Corp., Brooklyn, N.Y.
Quillian, Hugo, Quillian's Concrete, Daytona Beach, Fla.
Reinhart, William, Yonkers Concrete Products Co., Yonkers, N.Y.
Riley, Tom R., National Cement Co., Birmingham, Ala.
Rinker, Mr. and Mrs. M. E., Rinker Materials Corp., West Palm Beach, Fla.
Robertson, L. B., Portland Cement Association, Orlando, Fla.
Rogers, Ralph B., Texas Industries, Inc., Dallas, Texas
Rasborough, George, Jr., Shands & Baker, Inc., Jacksonville, Fla.
Rosche, A. P., Kem-Krete Service, Hillsboro, Ill.
Ross, Mr. and Mrs. C. Boyd, Marietta Concrete Corp., Baltimore, Md.
Rowell, Mr. and Mrs. C. F., Stearns Mfg. Co., Inc., Adrian, Mich.
Russell, Alexander H., The Burns & Russell Co., Baltimore, Md.
Ryan, Fred H., Portland Cement Association, Atlanta, Ga.
Schillinger, Jack, Destin Block Co., Miami, Fla.
Sergovic, John A., The Burns & Russell Co., Baltimore, Md.
Shaw, C. Lee, Florida Division, General Portland Cement Co., Tampa, Fla.
Shaver, John W., Concrete Publishing Corp., Chicago, Ill.
Shinall, Harry J., Katterjohn Concrete Products, Little Rock, Ark.
Shirley, A. L., Shirley Bros., Inc., Pahokee, Fla.
Shirley, C. L., Shirley Bros., Inc., Pahokee, Fla.
Shivley, Mr. and Mrs. Dick, Birmingham Slag Co., Birmingham, Ala.
Sinnicks, George S., Superior Block Co., Charlotte, N.C.
Smithwick, S. Carl, Smithwick Concrete Products, Portland, Ore.
Stamm, Allen G., Turbotville Block Co., Inc., Turbotville, Penn.
Stonock, Eugene, Alpha Portland Cement Co., Birmingham, Ala.
Stockard, H. J., Jr., North Carolina Concrete Masonry Association, Raleigh, N.C.
Stott, Gene, Besser Mfg. Co., Atlanta, Ga.
Streblow, Mr. and Mrs. A. G., Basalt Rock Co., Inc., Napa, Calif.
Street, E. B., Maule Industries, Inc., Miami Beach, Fla.
Street, Chas. G., Chas. G. Street Concrete, Daytona Beach, Fla.
Strohm, Carroll, Jr., Nashville Breeko Block Co., Nashville, Tenn.
Swerdlin, Jack, Cement Block Industries, Miami, Fla.
Switzer, Howard, Gene Olsen Corp., Griffin, Ga.
Tresch, Ernest H., Marietta Concrete Corp., Marietta, Ohio
Wahle, William C. G., Star Expansion Products Co., New York, N.Y.
Wakeman, E. M., E. M. Wakeman & Associates, Lakeland, Fla.
Wallis, Ben, G., Florida division, General Portland Cement Co., Tampa, Fla.
Walters, Mr. and Mrs. E. G., Garden Supplies, Inc., Forest Park, Ill.
Ward, H. K., Block Division, Jahncke Service, Inc., New Orleans, La.
Warlick, Nelson A., Warlick-Tart Supply Co., Valdosta, Ga.
Warren, Mr. and Mrs. S. M., Hamilton Concrete Products, Inc., Chattanooga, Tenn.
Weitzel, "Les", Forney's Inc., New Castle, Penn.
Weyland, W. C., Bergen Machine and Tool Co., Inc., Nutley, N.J.
Whitehead, John D., Penn-Dixie Cement Corp., Orlando, Fla.
Wilkerson, John, Penn-Dixie Cement Corp., Atlanta, Ga.
Williams, Mr. and Mrs. Doug, Katterjohn Concrete Products, Owensboro, Ky.
Williamson, F. L., Holloway Concrete Products Co., Inc., Winter Park, Fla.
Wilson, Charles R., Wilson Concrete Products, Inc., Riviera Beach, Fla.
Worrell, C. C., Kent Machine Co., Cuyahoga Falls, Ohio
Wynnegan, H., Bowden Concrete Products, Memphis, Tenn.
Yike, D. W., Master Builders Co., Atlanta, Ga.
Yookley, P. R., Pittsburgh Testing Laboratory, Jacksonville, Fla.
Young, H. T., The Kent Machine Co., Cuyahoga Falls, Ohio
Zimmerman, C. W., Cement Products and Supply Co., Inc., Lakeland, Fla.

Five engineers were added to the staff of Universal Concrete Pipe Co. during the past year to assist in the design and sale of the company's various concrete products. Pictured with H. X. Eschenbrenner, president (seated), during a 3-day conference at the home office in Columbus, Ohio, are engineering representatives (left to right), Billy T. Sumner, Nashville, Tenn.; Henry Gabbe, Jessups, Md.; William H. Sprang, Pittsburgh, Penn.; and Robert H. Gates, St. Petersburg, Fla. Not shown is Byron A. Bledsoe, Atlanta, Ga.

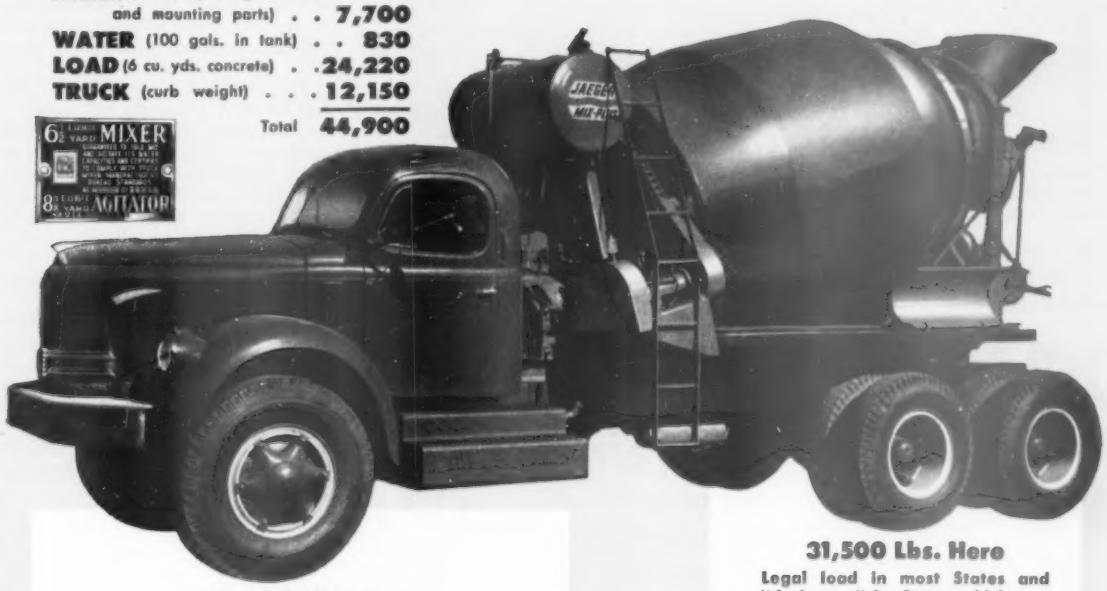
STOP OVERLOADING THE FRONT AXLE, TOO

Here is the only standard truck mixer that can carry 6 cu. yds. of concrete with a legal load on the rear axle and a safe 13,400 lbs. on the front.

1953 Model JAEGER 6½ YD. "MIX-PLUS"

on new 195" wheelbase Reo F226

MIXER (including full gas tank and radiator and mounting parts) . .	7,700
WATER (100 gals. in tank) . .	830
LOAD (6 cu. yds. concrete) . .	24,220
TRUCK (curb weight) . . .	12,150
Total	44,900



13,400 Lbs. Here

(where others place 14,500 to 15,500 lbs.)

13,400 lbs. is a reasonable front axle load. No truck in the class that will carry maximum payloads under GVW laws is rated or guaranteed to carry more.

31,500 Lbs. Here

Legal load in most States and "duck soup" for States which permit 32,000 lbs.

It's always possible to mount a truck mixer to be legal on the rear axle, if that's all you worry about.

But Jaeger is the only standard mixer that can haul a 6 yd. payload with 31,500 lbs. on the rear axle *and no more weight on the front axle than the axle will safely carry.*

With 13,400 lbs. on the front axle, Jaeger keeps you within proper operating limits for the long life expectancy of your trucks. With mixers that must place 14,500 to 15,500 lbs. in front (1100 to 2100 lbs. overload), operators are asking for, and getting, front axle and tire trouble.

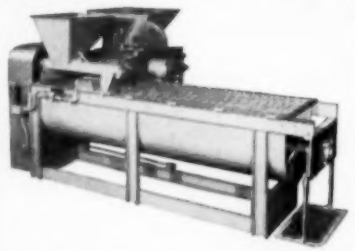
Check this important factor with your truck dealer and your Jaeger distributor — or write us for complete information and mounting details.

THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus 16, Ohio

TRUCK MIXERS, AGITATORS • PUMPS • COMPRESSORS • CONCRETE MIXERS • PAVING SPREADERS, FINISHERS

Jones (formerly Yoder)
CONTINUOUS MIXER



Embodies many successful new features, such as positive, non-clogging, vibrating belt feed, insuring constant volume of aggregate regardless of moisture content —no need for costly weighing equipment and moisture determinations.

Accurate proportioning through adjustable aggregate gates. Variable Speed drive for requirements ranging from 5 to 20 cu. yds. per hour. Cost only half that of batch mixer. More thorough mixing—gives up to 50% higher strength than 5-minute batch mix. Special advantages for light-weight aggregates. Illustrated literature and other information on request.

J. A. Jones CONCRETE MACHINERY
108 Horning Road, Pittsburgh 34, Pa.

Silo Manufacturers Annual Meeting

NATIONAL ASSOCIATION OF SILO MANUFACTURERS held its fortieth annual meeting at the Palmer House, Chicago, Ill., on December 1 and 2. A record attendance of nearly 200 greeted president C. Boyd Ross at the opening session.

The theme of the convention was Human Relations-Public and Industrial. Prominent speakers addressing the convention included: DeLoss Walker who spoke about the infiltration of communism in our government; Pauline Mandigo, who compared the economy of this country with Europe and the part silos had played in increasing farm prosperity; a stirring address by Dr. Tennyson Guyer on the importance of individual initiative; a talk by Carl B. Bender on research in grass silage; an address by Dr. Charles F. Rogers, Ohio Agricultural Experiment Station; and a talk by A. O. Wingender on "Grassaver Gas." Sir Walter Bristow of Jealott's Hill Research Station, Bracknell, Berks, England was the honored guest.

A committee report and panel discussion on a Public Relations Research Formula was presented by William Henry, chairman, assisted by Stewart Leonard and Bruce Craine. The report dealt with advertising and publicity in farm magazines in connection with the association seal displayed by members on all literature and advertising. The seal was designed to give buyers assurance of quality in workmanship and materials. Salesmen of member companies were urged to carry association membership cards.

The following officers were re-elected: president, C. Boyd Ross, Marietta Concrete Corp.; vice-president, Ben F. Gurney, Madison Silo Co.; and secretary-treasurer, Z. W. Craine, Craine, Inc.

Concrete Pipe School

THE SECOND ANNUAL SHORT COURSE SCHOOL of instruction of the American Concrete Pipe Association was held in Chicago, Ill., November 20-22, 1952, with 130 persons attending. The registration showed an increase of 20 percent over attendance of the first short course school in 1951, with Canada accounting for approximately 10 percent of those present. The course included sessions on culverts, sewers, sales and manufacturing.

The session on culverts and sewers was held on Thursday afternoon, November 20, at which time papers were presented by R. Robinson Rowe, engineer, California State Department of Highways, on "Concrete Pipe in Culvert Construction"; and P. H. McGauhey, assistant director of the Richmond Field Station of the University of California, on "Concrete Pipe in Sewer Consturction."

"Sales" was the subject for Friday, November 21. T. H. Monaghan and Walden Wren, Columbus, Ohio, covered the field from the viewpoint of the large producer; Dr. B. Franklin Bills, Northwestern University, presented basic fundamentals; and H. F. Peckworth and J. A. Ruhling spoke for the association.

Saturday, November 22, was devoted to a general discussion of manufacturing problems. E. F. Bespalow, Memphis, Tenn., headed a 6-man industry panel handling questions from the floor.

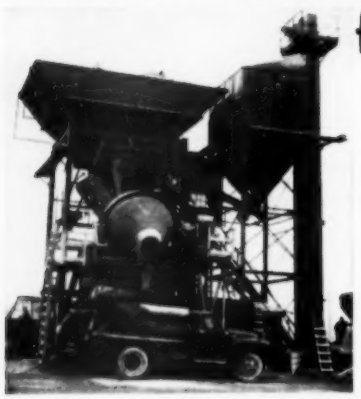
Industry members participated actively in all sessions. R. B. Carroll, Birmingham, Ala., E. F. Bespalow, Memphis, Tenn., and T. A. Thomas, Ada, Okla., expanded on Mr. McGauhey's presentation by relating their own experiences with concrete sewer pipe.

N.R.M.C.A. Safety Contest

FISCHER LIME & CEMENT CO., Memphis, Tenn., won top honors in the Class A group (those producing over 100,000 cu. yd. of concrete) in the 1952 safety competition, sponsored by the National Ready Mixed Concrete Association. This company operated without a single injury to employes or non-employes and with only two property-damage accidents during the contest period from July 1, 1951 to June 30, 1952.

In the Class B group (those producing from 50,000 to 100,000 cu. yd.

COMPLETE PLANTS
from a Single Source



- "Tilt-Up" Mixers
- Ready-Mix Plants
- Expressway Semi-Portable Plants
- Dry Batch Plants
- Cement Bins
- Aggregate Bins
- Cement Storage

ENGINEERED TO WORK TOGETHER

From conveyor to elevator, from bin to mixer Burmeister equipment is designed and built by the same organization. Because each product is *"engineered to work together"* you are assured less costly "conversions," maximum production speed, accurate delivery of materials, and greater economy of operation. See your nearest Burmeister Distributor or write for details.

FREE CATALOG
Send for new 16-page illustrated Catalog of Burmeister Plants and Equipment.

COMPLETE PLANTS FROM A SINGLE SOURCE
Burmeister
L. BURMEISTER CO., 4535 W. MITCHELL ST., MILWAUKEE 14, WISCONSIN

of concrete), the trophy winner was Morse Sand & Gravel Co., Inc., Attleeboro, Mass. Six other companies in the Class B group also had accident-free records and were awarded certificates of Achievement in Safety. These companies were:

Concrete Supply Co., Inc., Evansville, Ind.
Radcliff Gravel Co., Inc., Mobile, Ala.
Consumers Supply Co., Louisville, Ky.
Acme Ready Mix Concrete Co., Rockford, Ill.
Longview Concrete Pipe Co., Longview, Wash.
Michigan Foundation Co., Inc., Trenton, Mich.

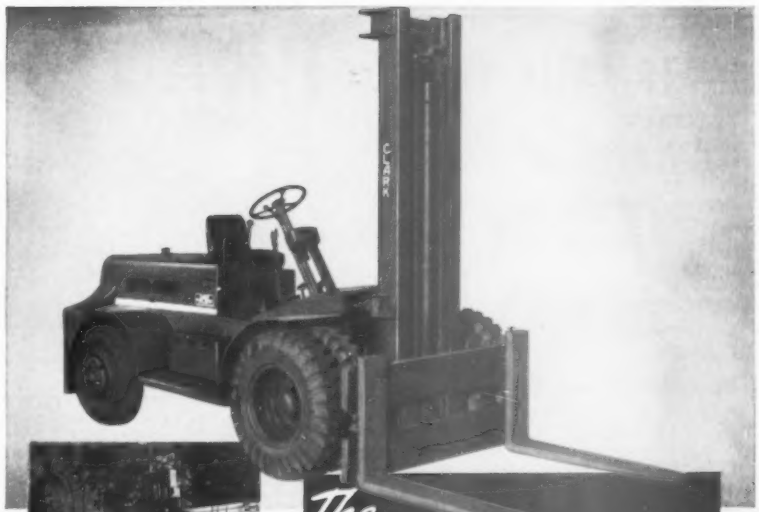
Acme Ready Mix Concrete Co. has had an accident-free record for two consecutive years.

There were 48 companies in the Class C group (those producing less than 50,000 cu. yd. of concrete) which had accident-free records. Thomas, Bennett & Hunter, Inc., Westminster, Md., with the greatest combined total of concrete produced and man-hours worked, was awarded the Class C trophy. Certificates of achievement were awarded to the following companies:

F. M. Reeves & Sons, Inc., Roswell, N.M.
**Rock River Ready Mix, Dixon, Ill.
**Blake Brothers Co., Richmond, Calif.
C. W. Blakeslee & Sons, Inc., New Haven, Conn.
F. D. Lewis & Son, Inc., Greensboro, N.C.
*Samuel Braen & Co., Mahwah, N.J.
**The Union Sand & Supply Corp., Painesville, Ohio
Frank Moritz and Sons Co., Mansfield, Ohio
*Modahl and Scott, Inc., Bloomington, Ill.
Land Construction Co., St. Joseph, Mo.
*Mesaba Construction Co., Hibbing, Minn.
*Tyler Ready-Mix Concrete Co., Tyler, Texas
The City Coal & Supply Co., Meadville, Penn.
*Certified Red-D-Mix Concrete, Lawton, Okla.
Findorff Lumber & Supply Co., Madison, Wis.
Island Dock, Inc., Kingston, N.Y.
Builders Supplies Co., Goldsboro, N.C.
Thorn Lumber Co., Martinsburg, W. Va.
*Pocahontas, Inc., Salisbury, Md.
Ready-to-Pour Concrete Co., Idaho Falls, Idaho
Brewer's City Coal Dock, Inc., Holland, Mich.
Richard Scully, Inc., Coatesville, Penn.
Verona Redi-Mix Co., Verona, Wis.
Evans Brothers Co., Newark, Ohio
***The Trumbower Co., Inc., Nazareth, Penn.
**Shamokin Ready Mixed Concrete Co., Inc., Shamokin, Penn.
*Coon Certified Concrete, Luzerne, Penn.
**Mooney Brothers Supply Co., New Castle, Penn.
Concrete Materials, Inc., Morristown, Tenn.
*Ready Mixed Concrete Co., Annandale, N.J.
Randecker Brothers, Lock Haven, Penn.
Shawnee Ready Mix Concrete & Asphalt Co., Inc., Plymouth, Penn.
*Helena Sand and Gravel Co., Helena, Mont.
**Gethmann Concrete & Materials Co., Gladbrook, Iowa
*Maysville Ready-Mix Concrete Co., Maysville, Ky.
Cairo Construction Corp., Cairo, N.Y.
Glynn Construction Co., Brunswick, Ga.
Certified Materials, Inc., Goshen, Ind.
*Wiltgen Ready Mix Co., Le Mars, Iowa
Mathews Ready Mix, Gridley, Calif.
Waverly Ready-Mix Co., Waverly, Iowa
**Monroe Ready-Mix & Material Co., Monroe, Wis.
Alvin Building Materials, Inc., Alvin, Texas
**American Aggregates Corp., Ready Mix Div., Greenville, Ohio
Mankato Ready Mixed Concrete Co., Mankato, Minn.
**Watertown Cement Products Co., Watertown, S.D.
Macy Brothers, Inc., Lynville, Iowa

The one-starred companies have had accident-free records for two consecutive years; two stars indicate an accident-free record for three consecutive years; one company. The Trumbower Co., Inc., Nazareth, Penn., has had a 5-year accident-free record.

There were 182 participating companies in the 1952 competition, compared with 157 companies in 1951.



The OUTDOOR TRUCK With Indoor Smoothness

15,000 lb. capacity, Clark Yardlift

6,000 lb. capacity, Clark Yardlift

4,000 lb. capacity, Clark Yardlift

2,000 lb. capacity, Clark Yardlift

The New CLARK YARDLIFT-100—Here's the truck for heavy outdoor handling, Clark's *new* YARDLIFT-100. 5-tons of cargo—in lumber, building blocks, concrete and clay pipe, brick and tile, heavy metal products—handled smoothly over rough, rutted terrain. And power to spare for safe, easy high-tiering of those 5-ton loads.

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beautiful pressed top Blocks

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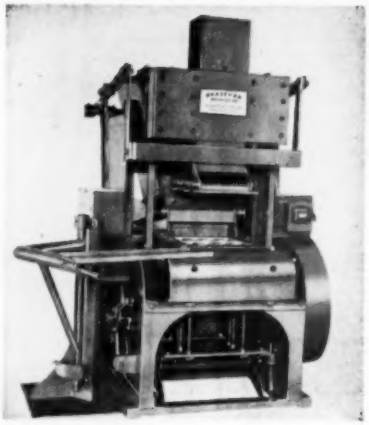
INTENSE DUAL VIBRATION

AUTOMATIC CYCLE
Capacity up to 400 blocks/hr.

Designed for small, med., & larger production plants

LOW PRICED
1953 Model Still
$3995.00 Complete



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We also manufacture:
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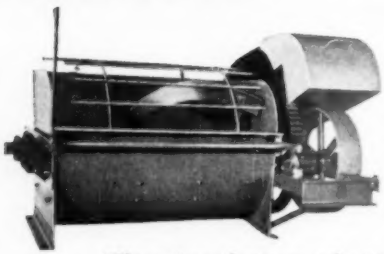

8 cu. ft. $495.00
16 cu. ft. $660.00
21 cu. ft. $740.00
30 cu. ft. $960.00

"The mixer that can take it"

- All ball bearing equipped
- Cast "WEARHARD" SPIRAL BLADES
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Soon a 50 Cubic Foot Mixer will be added to the PRASCHAK line of quality Equipment "Built to Take it" — Write for details Today.

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Periodically, we send out equipment bulletins on our newest developments. If your firm is not already on our mailing list, send us your firm name & address TODAY!

Genuine Original Equipment Parts on hand for Prompt Shipment

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We invite you to come to our plant For an equipment demonstration

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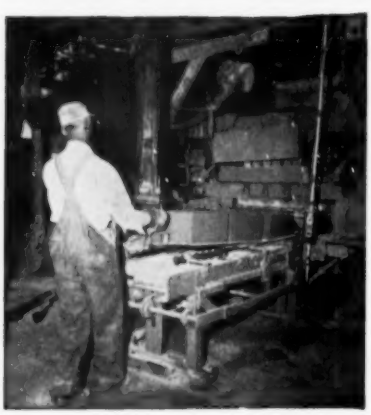

Showing two pallets with blocks being removed with off-bearer

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Many satisfied customers operating scores of machines.

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Write for name of Oswalt-Serviced plant nearest you.

. . . engineered by OSWALT
for *smoother* production of *better* blocks

New SHOCK-FREE BLOCK EJECTOR AND FRONT PALLET FEEDER

Assures smooth gentle motion in block delivery from mold and eliminates green cracking. Culls reduced to minimum.

Pallets automatically fed back through magazine to mold box from front end of machine, which saves time and simplifies handling.

New SIMPLIFIED DEVICE FOR HEIGHT AND DENSITY CONTROL

Correct, uniform height of blocks is assured automatically by control of the vibrating motors, while the adjustment of a special timer maintains constant density. Signal light system enables operator to govern feed so as to compensate for variations in mix.

Entire mechanism is so compact that space under rear of machine is clear of chains, shafts and gears, making clean-up easy and safe for workmen.

All these added features of Oswalt Service are designed to handle block production up to speeds of 1080 units or more per hour . . . without sacrifice of quality or the cracking of green blocks.

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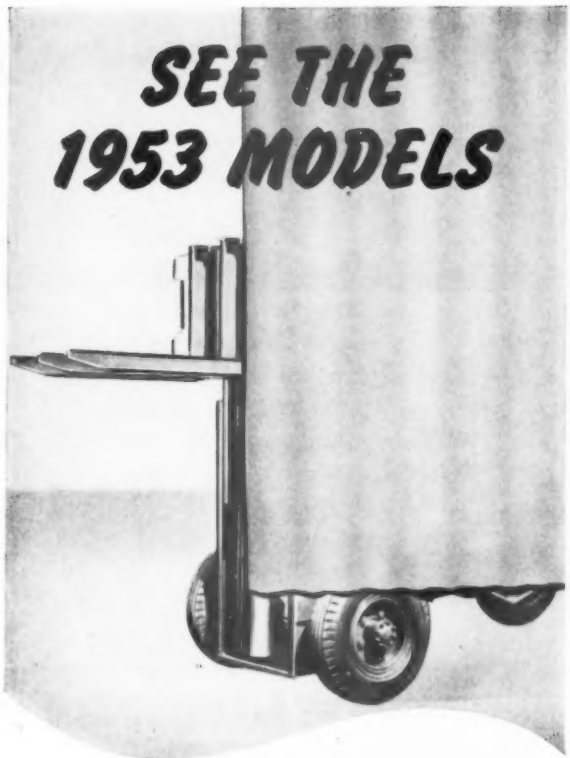

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with Standard Cement plus Solvay Calcium Chloride

- Cuts in half curing or protection period
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- Includes "built-in" curing
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To speed up operations and permit use of products in shorter time — especially in cold weather — add Solvay Calcium Chloride to your Portland Cement mixes. You get better workability, improved appearance, more uniformity and greater economy. In poured products, Solvay Calcium Chloride doubles your output and improves quality. Works equally well with all Portland Cements, including standard, high early, air entrained and low heat cements.

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CP-1

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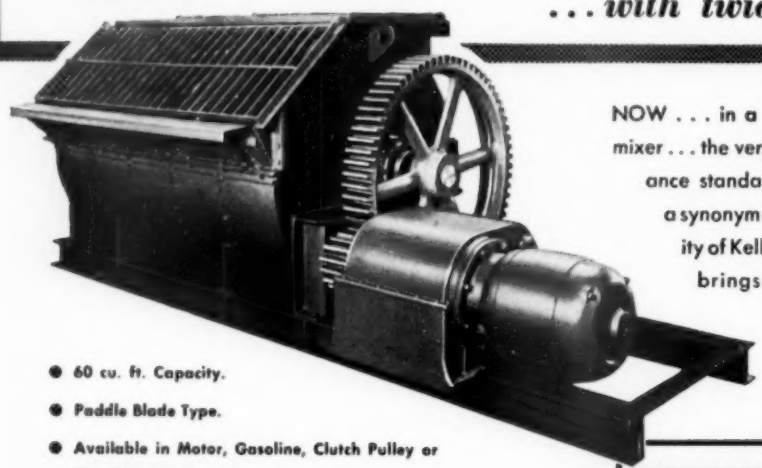
...with twice the capacity!



- 60 cu. ft. Capacity.
- Paddle Blade Type.
- Available in Motor, Gasoline, Clutch Pulley or Diesel Engine drives.
- Also available: 20 cu. ft. and 30 cu. ft. mixers.

Write for full technical information and specifications

NOW . . . in a new, big-production, big capacity mixer . . . the very same high precision and performance standards that have made Kelley mixers a synonym for perfection. With twice the capacity of Kelley's famed "30-D" Mixer, the "60-S" brings you greater efficiency, greater economy, more sustained, faster production. Yet, the over-all height is the same as the "30-D".

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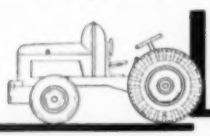

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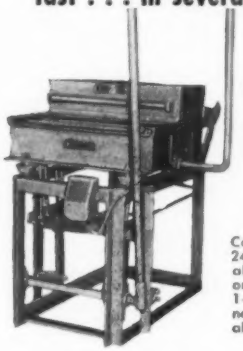
make $200 profit per day with new RAINBOW ROCK MACHINE

new building materials machine makes modern slump brick fast . . . in several sizes, colors . . .



cash in with this new machine . . . fully guaranteed only $750 fob factory compl. With Motor

Capacity of 1500 beautiful concrete slump bricks daily, 24" long, 3½" wide . . . 1½", 2½" or 3½" thick. Steel all-welded high speed machine operates easily, indoors or out, with wood pallets of 2x4 lumber. Complete with 1-HP elec. motor, or powered by gasoline engine. Needs no special skill, simple operating instructions and valuable mixing formulae included.

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no cost for individuality! labor cost cut 1/3!

The demand for exciting new Rainbow Rock is terrific. It's modern, practical, economical. Its many fade-proof pastel colors create desired individuality without extra expense. Sized larger than ordinary brick and easier to lay up, attractive Rainbow Rock cuts labor costs by one-third. And so many uses! Interior and outer walls, chimneys, fireplaces, steps, driveways, garden walls, walks, breezeways and garages. You can make it in several distinctively textured faces, perfect for latest building trends.

Fireplace of sensational new Rainbow Rock, one of the many luxurious effects with this versatile new building brick.

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You Can't Match McCracken FOR CONCRETE PIPE PRODUCTION

1. Doubles production in all sizes 4" to 36".
2. Handles 90% of suburban market—80% of metropolitan market.
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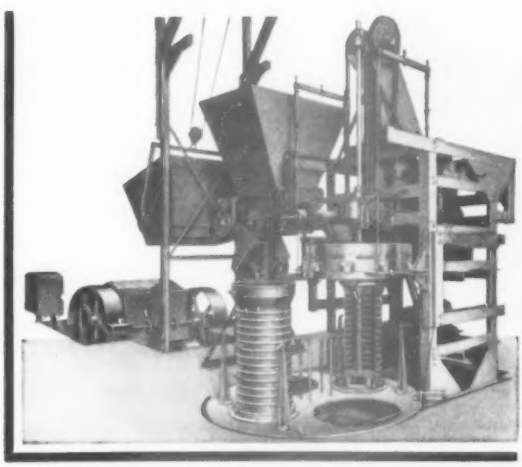

MODEL "T" (Pictured Above)—4" to 36"; MODEL "R"—4" to 18"; MODEL "D" for Drain Tile—sizes 4" to 16"

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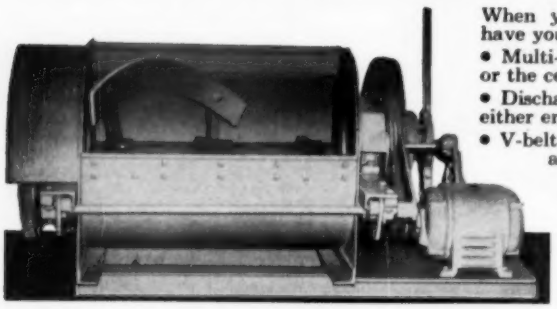
MAIN OFFICE AND FACTORY, SIOUX CITY, IOWA

CONCRETE PIPE MACHINERY CO. SIOUX CITY, IOWA

only MULTI-MIXER gives you a choice!



When you buy Multi-Mixer you have your choice of:

- Multi-blade paddle arrangement or the conventional spiral blades.
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- V-belt drive or direct drive motor, and right or left hand drive.
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All Multi-Mixers are of welded steel construction, in standard sizes from 3 to 60 cu. ft., and larger sizes to your specifications. Ask for Bulletin MM-11. Multiplex also makes fully automatic block machines, skip loaders, and compartment aggregate bins.

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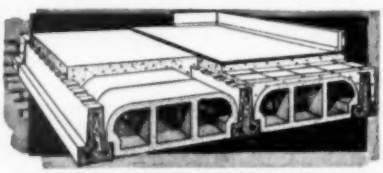
ATTENTION!

Mr. Block Producer

For Greater Volume and Bigger Profits Pave Your Way With F & A



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Territories still available west of the Mississippi and in the New England States. For detailed information on available territories and equipment for manufacture of F & A floors and roofs, write, wire or phone

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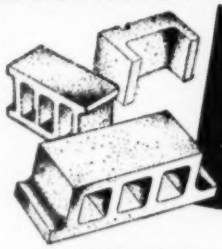

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Sturdy, non-corrosive metal, perfect threaded units, positive anchorage.

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Now Larger Pay Loads "THE ROCKET" TRUCK MIXER

Fast to Charge, Mix and Discharge

Open End Loading — Separate Engine Driven Revolving Drum

4½ CUBIC YARD MIXER / 6 CUBIC YARD AGITATOR
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Light Weight, Rugged Construction. Exclusive Hydraulic Control automatically raises and lowers Chute.

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Serving the CONCRETE INDUSTRY OVER 20 YEARS

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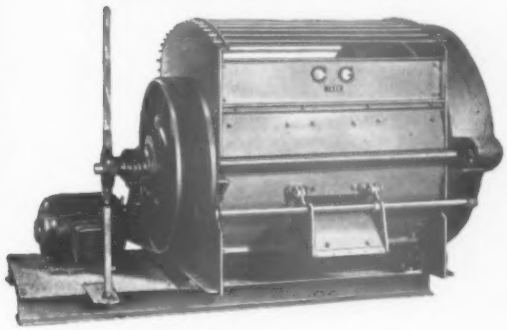
SIZES . . 14 . . 24 . . 36 . . 50 of CAPACITY

AND

BLOCK SPLITTER



Equipped with . . .

Abrasion Resisting steel liners
Motor and V. belt drive or clutch pulley drive

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WITH TRUSSED *Design*

the Backbone of Steel for Every Masonry Wall!

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NEW *Flush-Weld* CONSTRUCTION

"FOR TIGHTER Mortar Joints"

Enduring, crack-free beauty is built in every wall where Dur-O-waL is used as a backbone of steel. Patented, custom-designed Dur-O-waL is now available with both lap and butt weld to provide vertical and horizontal reinforcing for block, brick and tile and as a tie unit for face brick and backup block.

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You Can Produce

CONCRETE PRODUCTS

of Great Strength, Density and Smoothness with

"BRANFORD" AIR VIBRATORS

Shown here is one of several types of "BRANFORD" Portable Concrete Form Vibrators, available in a wide range of sizes. Other types for permanent vibrator installations can be supplied. One of the valuable features of "BRANFORD" Vibrating Equipment for concrete work is its VARIABLE SPEED. Low air consumption, high foot-pound impact and instant starting are other desirable qualities. We will gladly study your vibrator requirements and recommend proper equipment. Write or call us.

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STEARNS #9 Joltcrete	$2500.
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STEARNS 28 cu. ft. Concrete Mixer	1500.
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Largest Stocks of Pallets in the world. Send tracing or sample for quotation.

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GENERAL ENGINES CO.
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TRUCK MIXERS FOR SALE

Smith High Dump End Loaders, one 4 yard and one 3 yard, mounted on K8 Tandem Internationals, in operation daily.

Owners purchasing larger mixers. Prices very reasonable.

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Concrete Irrigation Pipe Manufacturing Plant. Located central San Joaquin Valley near Fresno. Exceptionally modern in mechanized equipment from handling of materials to loading cured pipe. $20,000 net 1951, ($20,000 plus) net to September 30, 1952. Owner established business 1937, has highest rating by Dun and Bradstreet. Underpriced at $76,500 plus inventory at cost. $6,000 a year manager will continue during transition period at reduced salary.

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P.O. Box 115, Caruthers, California

BARGAIN FOR QUICK SALE

Practically New Columbia Model 8 Automatic 2-Block Machine plus complete equipment for immediate sale at drastic reduction, due necessity larger installation. Plant and following equipment complete with motors can be seen in operation: 72 steel racks, 1200 steel pallets, 4-8-12" and slab mold boxes, skip hoist and bucket, 30-ft. mixer, offbear and spare parts. Will install and train production crews. Cash or terms.

GOCORP SOUTH-WEST COMPANY
302 Interurban Bldg., Dallas, Texas

FOR SALE

28 CUBIC FOOT STEARNS MIXER
GOOD CONDITION
FOND du LAC
CONCRETE PRODUCTS CORP.
183 WEST FOLLETT ST.
FOND du LAC, WISCONSIN

FOR SALE

Dunbrick machine.
3000 pallets.
13 racks.
12 cu. ft. Stearns mixer, skip hoist.
As a unit $3500.00
1000 pressed steel pallets $200.00

Dale B. Cornick Concrete Products
13th & Derby, Pekin, Illinois

FOR SALE

1 Senior Go Corp Block Machine
Plain Pallet.
Mold boxes for 4", 8", 12"
Less than 1 year old.
Subject to prior sale.

L. M. KENNEDY & SONS, 4400 Rising Sun Avenue, Philadelphia 40, Pa.

FOR SALE

2 Jackson and Church 12-pocket brick machines
1 3' x 8' Hardinge Rod Mill
1 4' x 16' Jackson & Church Rod Mill
2 Jackson & Church Autoclaves, 50' x 6', Bolted Head
1 Jackson & Church Autoclave, 58' x 6½', Quick-acting head
1 200 HP, 150 lb., Superior Steam Generator Package Unit
1 125 HP Stoker Fired Fire Tube Boiler
1 Vacuum Producer for Air Conveying
1 110 ft. Conveyor, 18 or 24", can be troughed
Bins, Hoppers
Motors, 1 HP to 50 HP
Miscellaneous Parts

Above being sold as result of fire to building. Above equipment undamaged.
Write, Phone or Wire.

GICHNER BUILDING & SUPPLY CO., INC.
Bowie, Md. Tel: Un-4-7579

FOR SALE

1—Winn, Vibra-Tamp, plain pallet air operated block machine, two block per cycle capacity.
1—Air Operated, two pallet offbearer.
1500—Plain Steel pallets, 18"x18"x¼".
48—Steel racks, 48 block capacity.
Priced to sell. Have replaced with larger machinery. BOSTON CONCRETE PRODUCTS, P. O. BOX 325, SO. BOSTON, VA.

UNBREAKABLE PALLET RINGS

Write for full information
TEXAS FOUNDRIES
LUFKIN, TEXAS

FOR SALE

1—Kelley Air Operated Block Machine, with 8'-6"-8" Mold Boxes.

Approx. 900 - 4", 900 - 6", 3000 - 8", 1200 - 12" } Pressed Steel Pallets

1—Stearns Yard Hoist without compressor (never used)

ALLCO CONCRETE PRODUCTS CO.
P. O. Box 191, Patchogue, N.Y., Ph. Patchogue 3-1015

FOR SALE

Complete Block Plant—Going Business
R. R. Siding. Fleming F. M. 180 Machine and Mixer. ¾ Ton and 2 Ton Trucks. Tile Machine and ½ Sack Mixer. 40 Horse Kewanee Boiler. No competition in vicinity.

H. D. JONES MARSHALL, MO.

FOR SALE

1 Gene Olson Jr. Twin Block machine; 4" mold box, 2200 pallets; 8" mold box, 1400 pallets; 12" mold box, 1100 pallets; extra bullnose for 8 inch and 12 inch block; 40 steel racks. This machinery can be seen in operation. Will sacrifice to make room for larger equipment.

W. L. MATTOX CONCRETE PRODUCTS CO.
Forrey & Daniel Sts., Newark, Ohio
Phone 6864

FOR SALE

1—28 S Rex stationary Concrete Mixer. 70% new, cast Drum. $1350.00

CHAS. CROSBY DE. 3998 Denver, Colo.

STOP that WATER

With FORMULA NO. 640
A clear liquid—7 different resins in a solvent which penetrates 1" or more into concrete, concrete blocks, stucco; seals, holds 1250 psf water pressure. Applies quickly — no mixing — no furring — no membrane—no cleanup. Use on forms—wood or concrete.
HAYNES PRODUCTS CO., OMAHA 3, NEBR.

FOR SALE

BLOCK PLANT — Capacity 1800 blocks daily. In city of 18,000 — no other within 40 miles. Photos and complete information furnished on request. Price $30,000.00. Might consider $10,000 cash for partial interest, with privilege of acquiring business later on. 10—all Welded Steel 48 Block Capacity racks and a hand operated 10-concrete brick capacity machine.

CAMERON, JOYCE & SCHNEIDER, INC.
Keokuk Iowa

FOR SALE

3,000 Commercial Pressed Steel Pallets 8" x 8" x 16", 3 core, 40% air space. Used only a few times—Excellent condition.

H. A. AHNERT & SONS
BUSHKILL, PA. Tel: Bushkill 37

FOR SALE

1 Hi-Lo - 3 yard mixer, 4½ agitator 1½ years, Price $1785.00
1 Rex - 2 yard mixer, high discharge, Price $975.00
1 Rex - 2 yard mixer, low discharge, Price $385.00

Changing our fleet to larger mixers

GENERAL READY MIXED CONCRETE, INC.
P. O. Box 1169, Clearwater, Fla.

CONCRETE BRICK COLORS
CEMENT COLORS
MORTAR COLORS

made by
BLUE RIDGE TALC CO., INC.
Henry, Virginia

FOR SALE

One Farquhar Sand and stone conveyor 20 ft. length, 18" wide, powered by Leroy gas motor and mounted on rubber tires for easy towing behind truck.

FOLTZ CONCRETE PIPE WORKS
Lexington, North Carolina

ALSO SEE CLASSIFIED ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

FOR SALE

Excellent #9 Joltcrete with 8" attachment, motor and power carriage. $500.00. Wonderful buy to strip for repairs.

Model A Clipper with 8 & 4" attachments. A-1 shape.

12" Clipper attachment with 1200 pallets.

GoCorp Junior with 8, 4, and 12" attachments and pallets.

12' Stearns mixer.

18' Stearns skip loader.

2,000# Hyster fork lift truck.

OLSEN SALES COMPANY
Rock Rapids, Iowa

WANTED

Nationally prominent manufacturer located in East desires to purchase plain pallet block machine. Must be thoroughly engineered and designed. No experimental type wanted. Should be capable of producing standard size blocks in 16" and 18" lengths.

Send full details with asking price in first letter to BOX L-31, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Illinois.

FOR SALE—Business No. 1. Crushing and washing plant; ⅝ yd. shovel; 4 trucks; loader and life time supply of gravel. Business No. 2. Ready Mix; cement block and dry ready mix package goods. New building; Columbia block machine; Kent continuous mixer; Quick steam generator and full line of equipment. Everything new. Located on RR just outside city limits. No competition within 25 to 40 miles. Will sell either business or both. One half cash, time on balance if desired. WEEKS CONCRETE PRODUCTS, WAUTOMA, WISCONSIN.

BUILD GOOD WILL FOR '53

With U.B. Line stretchers the most economical way, to keep your name before your mason's and mason contractors every working day of the year. Line pins, twigs, corner ties, and tools for the Blocklayer.

UNITED BUILDERS
1822 Lindberg Drive, Muskegon, Mich.

FOR SALE

Complete 6" Sand & Gravel plant, with all necessary equipment, including 5 late model trucks, shop, and office almost new, the reason for selling is sickness, if you are interested write for more details.

STERLING SAND & GRAVEL CO.
602 East Monroe, Sterling, Kansas

KEEP ABREAST
WITH
INDUSTRY TRENDS
THROUGH
ROCK PRODUCTS

LOWER COST
PACKER-HEAD WINGS
Proved to last as long or longer—yet cost considerably less. Write for prices.
TEXAS FOUNDRIES
LUFKIN, TEXAS

EXCEPTIONAL READY MIXED OPPORTUNITY

In connection with the operation of our block business we have the complete equipment installed for the automatic batching of up to 500 cubic yards of central mixed concrete a day. Aggregate supply of high quality sand and gravel adequately provided for. Aggregate bin storage capacity in excess of 2,000 cubic yards reclaimed automatically by conveyors into batching bins equipped with automatic weigh batchers. Bulk cement capacity 3,750 barrels.

We are looking for an experienced, enterprising concrete man who would like to put these facilities to work. He would have to supply his own concrete delivering equipment and set up and maintain his own sales operation. Obviously, only an experienced and financially responsible party could be interested in our proposal.

This business is located in one of the fastest growing university cities in the North Central states. Population 110,000 in the heart of a thriving dairy and agricultural market.

Our reason for wanting to make such an arrangement is that our concrete block and allied precast concrete business requires our entire capital and attention.

Write BOX L-26, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Ill.

WANTED

Bulk Cement Bin 400 to 500 barrel storage unloading Screw—Bucket Elevator—2 cubic yard Weigh Batcher. Advise full particulars including location and price.

Contact—W. H. DAY

JACKSON READY-MIX CONCRETE
P. O. BOX 1023, JACKSON, MISSISSIPPI
Telephone No. 3-1677

MANAGER

For Readymix, Gravel, and Building Material Operation. Must be able to take full charge. Must have good mechanical knowledge and be sales minded. Western location. Excellent future for right man. BOX L-29, CONCRETE PRODUCTS, 309 West Jackson Blvd., Chicago 6, Ill.

FOR SALE

BESSER MULTI-MOLD block machine, A-1 condition, w/4"-6"-8"-12" molds, 700 12" plain pallets. All $500.00.

LEONARD BLOCK CO.
BOX 329, CORNERSVILLE, TENN.

3 Type FB Turridor Trane Heaters, 6000 CFM for High-Pressure Steam.
1 5A "Iron Fireman" Stoker, 7½ H.P. motor.
1 Wilshire Sweeper with 47" Brushes.
2 Hydro-Electric Platform Trucks, 2 Bat. Chargers.
1 Baker-Raulang 3-Ton Platform Truck with spare Ready Power Unit.
1 Erickson Platform Truck.
All of this equipment is in good condition.
BOX L-17, CONCRETE PRODUCTS, 309 W. Jackson Blvd., Chicago 6, Illinois.

CEMENT COLORS

Write for free samples and prices of "LANSCO" CEMENT COLORS produced in 50 attractive shades. Packed in bulk and in 1 lb. and 5 lb. packages.
manufactured by
LANDERS-SEGAL COLOR CO.
73 Delevan St. Brooklyn 31, N. Y.

SUPERINTENDENT WANTED

To take full charge of our plant producing Haydite lightweight aggregate. Located 35 miles north of Kansas City. Superintendent will be required to live in neighborhood close to plant. Applicant should state age, education, experience and references. Permanent position and splendid opportunity for the right man.

CARTER-WATERS CORPORATION
2440 Pennway, Kansas City, Mo.

FOR SALE

2—1945 International Semi-COE H542-11 (5 ton-K11) Trucks

Excellent Condition—
Like-New Tires—
Small Stock Parts
Perfect for Quarry Use

READY MIXED CONCRETE CO., LTD.
Box 621 Dial 5-7491 or 5-7791
Staunton, Virginia

FOR SALE

2—Stearns Model #9 Joltcretes with power carriage, power offbearer and height control. Attachments and pallets to make 3⅝-7¾-12¾ 50% a. s. concrete blocks.
1—Stearns 42 cu. ft. mixer equipped with NiHard Sectional liners.
1—42' Inclined Stearns skip loader.
Turntables—racks—pallet oilers.
1—Vibrating table complete.
All equipment listed above in perfect condition and offered at greatly reduced prices. Write or phone us for particulars.

SHUTE CONCRETE PRODUCTS, INC.
Rt. No. 3, Richmond, Indiana
Phone 2-3250

PIPE MACHINE FOR SALE

McCRACKEN PIPE MACHINE

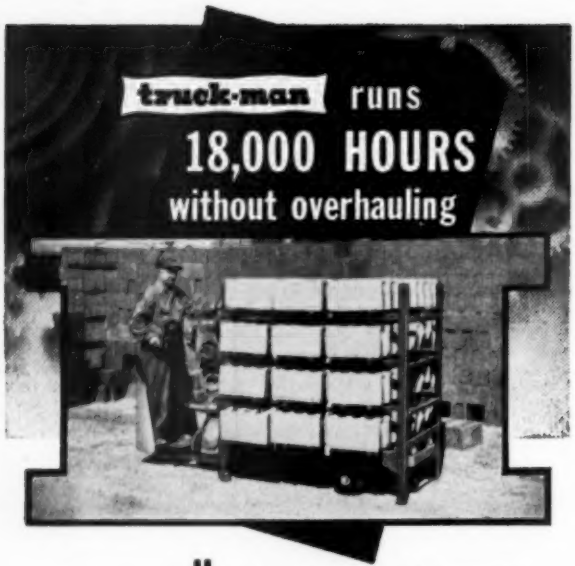
Three years of service,
Model "T" Machine
Forms and pallets
6"-36" incl., 4 foot lengths.

TWIN CITY CONCRETE PIPE CO.
106 - 6th Avenue, S.E.
MINNEAPOLIS, MINNESOTA

WANTED

72" or 84" Telsmith Super Scrubber or similar.

ANDERSEN SAND AND GRAVEL CO.
401 ATWATER ST., SAGINAW, MICHIGAN



Here's what Knox Concrete Products, Inc., Knoxville, wrote us when they placed an order for replacement parts recently:

". . . We are not only well pleased but we do not believe there is a piece of equipment on the market which would serve our requirements any better . . . Our normal load would probably run in the neighborhood of 4000 lbs. . . . We now have four Truck-Men . . . that run possibly *20 hours every day continuously* . . . The cost of operating a Truck-Man is certainly extremely low, as it uses very little gas and oil . . . We have had very little maintenance on this equipment."

". . . After six years at approximately 10 hours per day steady running I find it necessary to rebuild the majority of gears, sprockets and other movable parts on one Truck-Man and prepare to do so on another . . ." says Cement Block Industries, Coral Gables, Florida.

What more need we say? That last statement works out to approximately 18,000 hours of trouble-free operation. What would the record show if they had been using the *new* Truck-Man with its husky 5.8 h.p. Wisconsin engine? It's Truck-Man's low weight to pay-load ratio combined with rugged power that makes possible its unequalled efficiency in block-plant operation. You burn only a gallon of gas on most 8-hour shifts yet spot the heaviest racks in jig-time. Rubber cushioned ride, hydraulic lift, smooth start and stop mean no costly checking of blocks. Lower costs from purchase through maintenance and big savings in manpower—everyday—for years—make Truck-Man your *first* necessity for block handling. Available in skid, pallet, platform and *New* tractor models.

Send for full details in our new 1952 catalog.

truck-man Div. of The KNICKERBOCKER CO.
650 Liberty Street • Jackson, Mich.

Name_____

Title_____

Address_____

City_____ Zone____ State_____

See the two new Truck-Man trucks designed especially for Concrete Products plants in booth 40 and 41 at Concrete Industries Exposition, Cleveland January 25-29.

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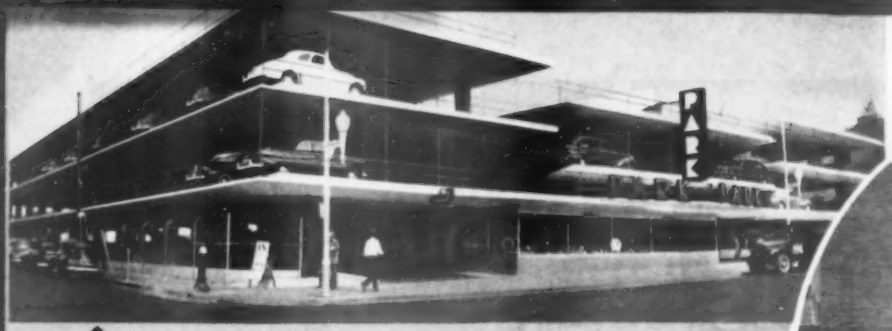
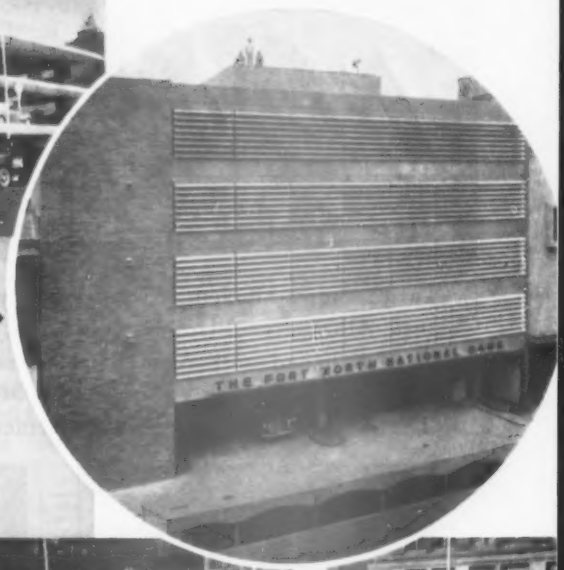
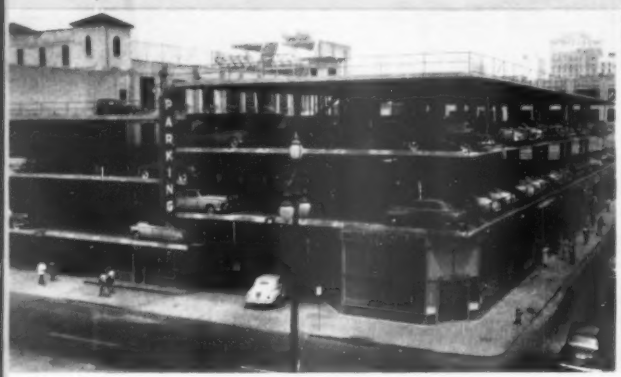


Miami Parking Garage, Miami, Florida. Archt.—Robert Law Weed; Contr.—Gust K. Newberg—both of Miami, Fla. Pozzolith Ready-Mixed Concrete supplied by Maule Industries, Miami Beach, Fla.

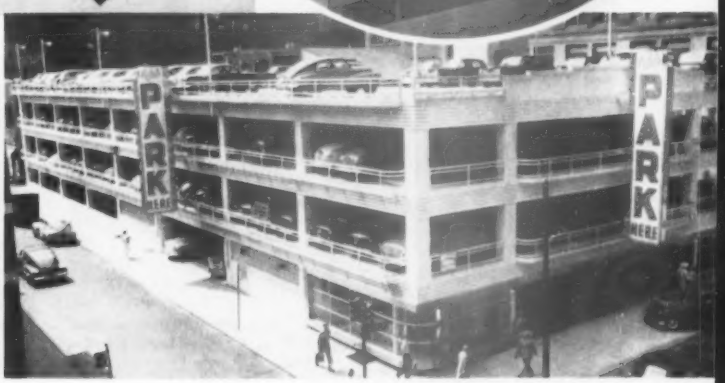


Fort Worth National Bank Garage, Fort Worth, Texas. Archt.—Preston M. Geren; Contr.—Thos. S. Byrne, Inc.; Pozzolith Ready-Mixed Concrete supplied by Fort Worth Sand & Gravel Co.—all of Fort Worth, Tex.

Blaise Parking Garage, New Orleans, La. Archt.—Diboll-Kessels & Assoc.; Contr.—Gervais F. Favrot Co.; Pozzolith Ready-Mixed Concrete supplied by Jahncke Service, Inc.—all of New Orleans, La.



Eglin's Garage, Philadelphia, Pa. Archt.—W. F. Sillman; Engr.—J. E. Good; Contr.—John A. Robbins Co., Inc., Pozzolith Ready-Mixed Concrete supplied by Warner Co.—all of Philadelphia, Pa.



POZZOLITH READY-MIXED CONCRETE
In Nation's Outstanding Garages

These four modern parking garages are representative of the many important structures of all types which have been built with Pozzolith Ready-Mixed Concrete.

Among the reasons for the wide acceptance and use of Pozzolith Concrete are the following:

- EASIER PLACEABILITY — for lower placing costs
- MINIMIZED SEGREGATION — for better appearance
- REDUCED SHRINKAGE — for less cracking
- LOWER PERMEABILITY — for less "waterproofing" expense
- INCREASED BOND-TO-STEEL — for better construction
- GREATER DURABILITY — for longer life concrete

Pozzolith produces these benefits *at lower cost than by any other means.* Why? Because it disperses cement, reduces unit water content and entrains the *optimum* amount of air. *Full information on request.*

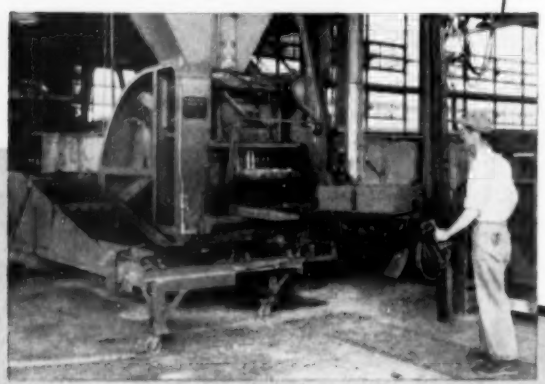
Over 600 Leading Ready-Mixed Plants
Are Producing Pozzolith Ready-Mixed Concrete

the MASTER BUILDERS Co.

CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO, ONTARIO

Life began... with STEARNS 15

Large, Super-Efficient, Architecturally-Perfect, All-Stearns Plant in Louisville, Ky., Well Satisfied with New 15's Increased Production of Quality Blocks That More Than Meet Every Trade Requirement.



Here is the *heart* of one of the most efficiently operated concrete block plants in America at Louisville, Ky.—the *fully automatic, vibratory, plain pallet Stearns 15* with pneumatic off-bearer and automatic pallet return, installed last July. Operator is James Ray. Contractors within a 50-mile radius and U. S. Government Engineers as far away as Fort Knox have learned to depend upon this company's blocks for their unvarying, high load-bearing strength, low moisture absorption and good looks. The Ready-Mix Company also operates a 50-cu. ft. Mixer and a Yard Hoist, both Stearns.

R-M READY-MIX CONCRETE COMPANY

POPLAR LEVEL ROAD AT SELLIOTT AVENUE, LOUISVILLE 12, KENTUCKY • PHONE MA 1600 – MA 8681

October 15, 1952

Stearns Manufacturing Company, Inc.
Adrian, Michigan

Gentlemen:

Life began in July, 1952, for Ready-Mix Concrete Company of Louisville, Kentucky, on the arrival of our new, one-man Stearns 15.

The new "15," equipped with pneumatic off-bearer and automatic pallet return, has proven very satisfactory from every standpoint. Our downtime has been reduced to a minimum; our production has increased appreciably, and the quality of our blocks from the standpoints of low-absorption and high compressive strength more than meets every trade requirement.

We have experienced absolutely no mechanical difficulty with the machine during its first three months of operation, and, because of Stearns' reputation for prompt parts replacements and efficient personal service when needed, we feel we have little to worry about on that score.

Cordially yours,

C. E. Bales
Plant Superintendent

Ready-Mix Concrete Company from the air. The plant was designed and built from the ground up in 1948 on a 50-acre once wooded tract east of the city. The spacious main building, housing the *rugged, dependable, one-man Stearns 15*, is 240′ x 90′ and built for expansion. Efficiency, cleanliness and employee comfort were "musts" in its construction from *Stearns concrete block*. A two-room materials-testing laboratory, a shower room and a lunch room—time clocks and a siren to mark the start and end of work—a 62′ storage bin tower, an automatic boiler for steam-curing blocks and brick in six 72-rack kilns—newspaper and radio advertising—these plus the *ownership of the high production—low maintenance Stearns 15*, make this plant a shining example to any one who would make sure of *success* in the concrete block business.

"Efficiency and cleanliness really pay off!" says C. E. Bales, left, Ready-Mix plant superintendent and a civil engineer with years of experience in the construction game. Center is Roy Tilford, maintenance foreman; right, Francis Zink, machine foreman, and above, Sam Brinley, driver of one of the company's 15 trucks for the delivery of ready-mix concrete, also produced in large quantities at the plant.

OWNERSHIP — THE KEY TO SUCCESS!

STEARNS
MANUFACTURING COMPANY · INC
ADRIAN • MICHIGAN

ROCK PRODUCTS

DIRECTORY OF MANUFACTURERS' EQUIPMENT

1953

Machinery, equipment and supplies for the Rock Products' Industries are listed alphabetically and the names and addresses of manufacturers indicated.

Advertisers who use ROCK PRODUCTS are identified by a dot (•) preceding the listing.

Numbers under manufacturers' listing identify subdivision in which their equipment falls. See beginning of each classification for code identificaton.

A

ABRASIVES

• **AMERICAN WHEELABRATOR & EQUIP. CORP.**, 1281 S. Byrkit St., Mishawaka, Ind.

PANGBORN CORP., 120 Pangborn Blvd. Hagerstown, Md.

TAMMS INDUSTRIES INC., 228 N. LaSalle St. Chicago 1, Ill.

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York, 20, N.Y.

VICTOR ENGINEERING CORP., 15 Maple Ave., Paoli, Pa.,

ADMIXTURES, Aggregate

AMERICAN BITUMULS & ASPHALT CO., 200 Bush St., San Francisco 4, Calif.

AMERICAN VERMICULITE CORP., 654 Madison Ave., New York 21, N.Y.

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N.Y.

• **THE MASTER BUILDERS CO.**, 7016 Euclid Ave., Cleveland 3, Ohio

• **ORONITE CHEMICAL CO.**, 38 Sansome St., San Francisco, Calif.

• **REARDON INDUSTRIES, INC.**, 2837 Stanton Ave., Cincinnati 6, Ohio

• **SOLVAY PROCESS DIV.**, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N.Y.

TRUSCON LABORATORIES, Milwaukee Jct. P.O., Detroit 11, Mich.

AERATION UNIT, for Blending Agitation in Bins

• **THE BIN-DICATOR CO.**, 13946 Kercheval Ave., Detroit 15, Mich.

AERIAL TRAMWAYS

• **BRITISH ROPEWAY ENGINEERING CO., LTD.**, Plantation House, Mincing Lane, London E.C.3, England

• **JOHN A. ROEBLING'S SONS CO.**, 640 S. Broad St., Trenton 2, N.J.

• **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.

YARA ENGINEERING CORP., Interstate Eqpt., Div., 18 West Jersey St., Elizabeth 4, N.J.

AFTERCOOLERS, Air

• **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

PENNSYLVANIA PUMP & COMPRESSOR CO., Bushkill Drive, Easton, Pa.

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

YOUNG RADIATOR CO., 709 S. Marquette St., Racine, Wis.

AGGREGATES, for Concrete, Lightweight Slag, Haydite, Pumice, Perlite, Cinders, etc.

• **ALEXITE ENG., DIV.**, Alexander Film Co., Colorado Springs, Colo.

AMERICAN VERMICULITE CORP., 654 Madison Ave., New York 21, N.Y.

• **BESSER MFG. CO.**, Alpena, Mich.

• **THE CARTER-WATERS CORP.**, 2440 Pennway, Kansas City 8, Mo.

LEHIGH MATERIALS CO., Lansford, Pa.

R. P. MCMINDES, INC., P.O. Box 52, Ashland, Pa.

• **THE MARIETTA CONCRETE CORP.**, Westview, Marietta, Ohio

H. HESSEY MILLER, Delaware Ave. & Flower St., Chester, Pa.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

• **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.

THE WAYLITE CO., 105 W. Madison St., Chicago 2, Ill.

ZONOLITE CO., 135 S. LaSalle St., Chicago 3, Ill.

AGITATORS (see Vibrators, Portable Concrete)

AGITATORS, Slurry (see Slurry Agitators)

AIR COMPRESSORS

1. Portable
2. Stationary

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
2

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
1—2

• **AMERICAN BRAKE SHOE CO., KELLOG DIV.**, 97 Humboldt St., Rochester 9, N.Y.
1—2

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.
1—2

• **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.
1—2

• **FULLER COMPANY**, Catasauqua, Pa.
2

• **GARDNER-DENVER CO.**, Quincy, Ill.
1—2

THE GRAY CO., INC. 60-11th Ave., N.E., Minneapolis 13, Minn.
1—2

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.
1—2

• **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio
1—2

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
1—2

• **LEROI COMPANY**, 1706 S. 68th St., Milwaukee 14, Wisc.
1

PENNSYLVANIA PUMP & COMPRESSOR CO., Bushkill Drive, Easton, Pa.
2

QUINCY COMPRESSOR CO., 217 Maine St., Quincy, Ill.
1—2

GORDON SMITH & CO., INC., 348 College St., Bowling Green, Ky.
1—2

• **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.
2

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
1—2

AIR CONDITIONING EQUIPMENT

AMERICAN BLOWER CORP., Detroit 32, Mich.

AMERICAN VENTILATING HOSE CO., Div. Callahan Zinc-Lead Co., Inc., 100 Park Ave., New York 17, N.Y.

C. L. AMMERMAN CO., 104 No. 2nd St., Minneapolis 1, Minn.

BUFFALO FORGE CO., 490 Broadway, Buffalo 4, N.Y.

CLARAGE FAN COMPANY, Kalamazoo 16, Mich.

• **GENERAL ELECTRIC CO.**, 1 River Rd., Schenectady 5, N.Y.

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

YOUNG RADIATOR CO., 709 S. Marquette St., Racine, Wis.

AIR CONVEYORS (see Conveyors, Air)

AIR ENTRAINING AGENTS

AUTOLENE LUBRICANTS CO., P.O. Box 4044 So. Denver Sta., Denver, Colo.

• **THE CARTER-WATERS CORP.**, 2440 Pennway, Kansas City 8, Mo.

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

• **DEWEY AND ALMY CHEMICAL CO.**, 62 Whittemore Ave., Cambridge 40, Mass.

• **FLEMING MFG. CO.**, 105 Fleming Ave., Cuba, Missouri

• **HERCULES POWDER CO.**, 946 King Street, Wilmington 99, Dela.

• **THE MASTER BUILDERS CO.**, Sub. of American-Marietta Co., Cleveland 3, Ohio

MINERAL PIGMENTS CORP. Washington Blvd., Muirkirk, Md.

• **NOPCO CHEMICAL CO.**, First & Essex Sts., Harrison, N.J.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N.J.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

SPRAY-O-BOND COMPANY, 2225 N. Humboldt, Milwaukee 12, Wis.

CHARLES R. WATTS & CO., 4121 Sixth Ave., N.W., Seattle 7, Wash.

AIR FILTERS

AMERICAN AIR FILTER CO., INC. 215 Central Ave., Louisville 8, Ky.

AMERICAN WHEELABRATOR & EQUIP. CORP., 1281 S. Byrkit St., Mishawaka, Ind.

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.

E. D. BULLARD CO., 275 Eighth St., San Francisco 3, Calif.

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

C. A. NORGREN CO., 3400 S. Elati St., Englewood, Colo.

AIR HEATERS

• **THE BABCOCK & WILCOX CO.**, 161 W. 42nd St., New York 17, N.Y.

• **GENERAL ELECTRIC CO.**, 1 River Rd., Schenectady 5, N.Y.

AIR LINE LUBRICATORS

HARDSOCG PNEUMATIC TOOL CO., 225 So. Benton, Ottumwa, Iowa

• **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

• **NEW HAVEN VIBRATOR CO.**, 131 Chestnut St., P.O. Box 1669, New Haven 7, Conn.

C. A. NORGREN CO., 3400 S. Elati St., Englewood, Colo.

AIR RECEIVERS, Tanks, Steel

• **GENERAL AMERICAN TRANSPORTATION CORP.**, 135 So. LaSalle St., Chicago 90, Ill.

• A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

● **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
● **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.

AIR SEPARATORS

● **BRADLEY PULVERIZER CO.**, 123 S. Third St., Allentown, Pa.
● **COMBUSTION ENGR.-SUPERHEATER, INC.**, Raymond Pulverizer Div., 1319 N. Branch St., Chicago 22, Ill.
● **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
● **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
● **KENNEDY VAN SAUN MFG. & ENGR. CORP.**, 2 Park Ave., New York 16, N.Y.
● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
SPROUT WALDRON & CO., INC., Muncy, Pa.
● **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
● **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N.Y.
● **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.

AIR TRANSPORT SYSTEMS (see Conveyors, Air)

ALLOYS

1. Abrasion Resisting
2. Heat Resisting
3. Manganese

ALLIED STEEL & TRACTOR PRODUCTS, INC., 7835 Broadway, Cleveland 5, Ohio
1—3
● **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
1—2—3
● **AMERICAN MANGANESE STEEL DIV., AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
1—3
● **CARBOLOY DEPT. OF G. E. CO.**, 11177 E. Eight Mile Road, Detroit 32, Mich.
1—2
● **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
3
HAYNES STELLITE CO., Div. of Union Carbide & Carbon Co., So. Lindsay St., Kokomo, Indiana
1—2
● **JONES & LAUGHLIN STEEL CORP.**, 401 Liberty Ave.—Gateway Center Pittsburgh 30, Pa.
1
● **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
3
MIR-O-COL ALLOY CO., INC., 340 N. Avenue 21, Los Angeles 31, Calif.
1—2—3
● **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
3
REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio
1—2—3
● **JOSEPH T. RYERSON & SON, INC.**, P. O. Box 8000-A Chicago 80, Ill.
1—2—3
THE SIGHT FEED GENERATOR CO., P. O. Box 38, West Alexandria, Ohio
1—2—3
● **STEARNS MFG. CO., INC.** Beecher St., Adrian, Mich.
1
● **STOODY COMPANY**, 11929 E. Slauson Ave., Whittier, Calif.
1—2—3
● **STROH PROCESS STEEL CO.**, 1428 High St., N.S., Pittsburgh 12, Pa.
1
● **STULZ-SICKLES COMPANY**, 141 Lafayette St., Newark 5, N.J.
3
● **THOMAS FOUNDRIES, INC.**, P.O. Box 1111, Birmingham 1, Ala.
1—2
● **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 LaSalle St., Chicago 4, Ill.
1—2
● **VICTOR EQUIPMENT CO.**, 844 Folsom St., San Francisco 7, Calif.
1—2

ALTERNATORS, Electric

● **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
● **ELECTRIC MACHINERY MFG. CO.**, 800 Central Avenue, Minneapolis 13, Minn.
● **GENERAL ELECTRIC CO.**, 1 River Rd., Schenectady 5, N.Y.

AMMETERS, Electric

THE BRISTOL CO., Waterbury 20, Conn.
● **GENERAL ELECTRIC CO.**, 1 River Rd., Schenectady 5, N.Y.

ANTI-FRICTION BEARINGS (see Bearings)

APRON FEEDERS (see Feeders, Apron)

ARC WELDING APPARATUS (see Welding Machines, Arc)

ASPHALTIC CONCRETE, Cold Mix—Cold Lay

● **NATIONAL AMALGA-PAVE, INC.**, 357 S. Robertson Blvd., Beverly Hills, Calif.

ASPHALT MIXING PLANTS

AMALGA-PAVE EQUIPMENT, INC., 357 So. Robertson Blvd., Beverly Hills, Calif.
AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.
● **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
● **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.
● **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
● **IOWA MFG. CO.**, 916-16th St., N.E., Cedar Rapids, Iowa
● **KWIK MIX COMPANY**, Port Washington, Wisc.
● **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
● **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
STANDARD STEEL CORP., 5036 Boyle Ave., Los Angeles 58, Calif.
● **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave., N.W., Cedar Rapids, Iowa

AUTOCLAVES, Laboratory

AMERICAN INSTRUMENT CO., INC., Silver Spring, Md.
CENTRAL SCIENTIFIC CO., 1700 Irving Park Road, Chicago 13, Ill.
● **JACKSON & CHURCH CO.**, 321 N. Hamilton St., Saginaw, Mich.
PRECISION SCIENTIFIC CO., 3737 W. Cortland St., Chicago 47, Ill.

AXLES, Truck

● **EATON MFG. CO.**, Axle Div., 739 E. 140th St., Cleveland 10, Ohio

AXLES & WHEELS, Car & Locomotive

● **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
THE ATLAS CAR & MFG. CO., 1140 Ivanhoe Road, Cleveland 10, Ohio
THE C. S. CARD IRON WKS., CO., P.O. Box 117, Denver 1, Colo.
PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.
● **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.

B

BABBITT METAL (see Bearing Metals)

BAG CLEANERS

THE DAY COMPANY, 810 Third Ave., N.E., Minneapolis 13, Minn.
● **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio
SPROUT WALDRON & CO., INC., Muncy, Pa.

BAGGING MACHINES

● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

BAGS, Dust Collector

AMERICAN WHEELABRATOR & EQUIP., CORP., 1281 S. Byrkit St., Mishawaka, Ind.
● **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah
● **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio
PANGBORN CORP., 120 Pangborn Blvd., Hagerstown, Md.

BAGS

1. Paper
2. Cloth

● **BEMIS BROS. BAG CO.**, 408-M Pine St., St. Louis 2, Mo.
1—2
● **CHASE BAG COMPANY**, 309 W. Jackson Blvd., Chicago 6, Ill.
1—2
EQUITABLE PAPER BAG CO., INC., 45-50 Van Dam St., Long Island City 1, N.Y.
2
FULTON BAG & COTTON MILLS, 170 Boulevard, S.E., Atlanta, Ga.
1—2
● **HAMMOND BAG & PAPER CO.**, P.O. Box 430, Wellsburg, W. Va.
1
● **HUDSON PULP & PAPER CORP.**, 505 Park Ave., New York 22, N.Y.
1
● **KRAFT BAG CORP.**, 630 Fifth Ave., New York 17, N.Y.
1
MENTE & CO., INC., 1401 Montegut St., New Orleans 17, La.
2
SECURITY BAG COMPANY, 26 Broadway, Brooklyn 11, N.Y.
1
● **UNION BAG AND PAPER CORP.**, 233 Broadway, New York 7, N.Y.
1
UNIVERSAL PAPER BAG CO., New Hope, Pa.
1

BAG TIES, Wire

● **COLORADO FUEL & IRON CORP.**, P.O. Box 1920, Denver 1, Colo.
FULTON BAG & COTTON MILLS, 170 Boulevard, S.E., Atlanta, Ga.
SECURITY BAG COMPANY, 26 Broadway, Brooklyn 11, N.Y.

BALL BEARINGS (see Bearings, Ball)

BALL MILLS (see Mills, Ball)

BALLS & SLUGS, Grinding (see Grinding Media)

BARGES, Sand and Gravel, etc.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.
● **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
YAUN MFG. CO., Box 1508 Baton Rouge, La.
● **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

BATCHERS, BIN

1. Weighing
2. Volumetric

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2
AUTOMATIC LIQUID METER CO., 1372-78 E. 15th St., Los Angeles 21, Calif.
2
● **BAILEY METER CO.**, 1050 Ivanhoe Road, Cleveland 10, Ohio
2
● **BESSER MFG. CO.**, Alpena, Mich.
1
● **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
1—2
BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
1
● **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
1—2
● **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
1
● **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
1—2
● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
1
CONSTRUCTION MACHINERY CO'S., Glenwood & Vinton, S.E., Waterloo, Iowa
1
THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.
1—2
● **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
1
GAR BRO. MFG. CO., 2415 E. Washington Blvd., Los Angeles 21, Calif.
1
HARDY SCALES CO., 5701 S. Atlantic Blvd., Maywood, Calif.
1
● **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
1
THE HOWE SCALE CO., Rutland, Vt.
1
● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
1
● **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
1—2

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

OMEGA MACHINE CO., 345 Harris Ave., Providence 1, R.I.
1—2

RICHARDSON SCALE CO., 668-698 Van Houten Ave., Clifton, N.J.
1

SAKRETE, INC., P.O. Box 11, Cincinnati 17, Ohio
1

SCHAFFER POIDOMETER CO., 2828—Smallman St., Pittsburgh 22, Pa.
1

SCIENTIFIC CONCRETE SERVICE CORP., 724 Salem Ave., Elizabeth 3, N.J.
1

• **SINTERING MACHINERY CORP.**, Box 68, Netcong, N.J.
1—2

CHARLES R. WATTS & CO., 4121 Sixth Ave., N.W., Seattle 7, Wash.
2

BATCHING PLANTS

ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge 41, Mass.

• **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.

• **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

• **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.

• **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

• **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.

GAR BRO. MFG. CO., 2415 E. Washington Blvd., Los Angeles 21, Calif.

• **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.

• **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio

• **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

THE NICHOLSON CO., INC., 10 Rockefeller Plaza, New York 20, N.Y.

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

• **WILLARD CONCRETE MCHRY. SALES CO.**, 2906 Imperial Hway., Lynwood, Calif.

BATTERY CHARGING EQUIPMENT

• **GENERAL ELECTRIC CO.**, 1 River Rd., Schenectady 5, N.Y.

GENERAL SCIENTIFIC EQUIPMENT CO., 27th & Huntingdon Sts., Philadelphia 32, Pa.

HOBART BROTHERS CO., Hobart Square, Troy 1, Ohio

D. W. ONAN & SONS, INC., University Ave., S.E., at 25th, Minneapolis 14, Minn.

BEARING METALS

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.

• **HYATT BEARINGS DIV.**, General Motors Corp., Harrison, N.J.

• **NATIONAL BEARING DIV. OF AMER. BRAKE SHOE CO.**, 4930 Manchester Ave., St. Louis 10, Mo.

• **JOSEPH T. RYERSON & SON, INC.** P.O. Box 8000-A, Chicago 80, Ill.

BEARINGS

1. Ball
2. Roller
3. Thrust

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
1

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2—3

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
3

THE FAFNIR BEARING CO., Booth St., New Britain, Conn.
1

• **HYATT BEARINGS DIV.**, General Motors Corp., Harrison, N.J.
2

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
1—2—3

NEW DEPARTURE, Div. of Gen. Motors Co., Bristol, Conn.
1

NICE BALL BEARING CO., 30th & Hunting Park Ave., Philadelphia 40, Pa.
1—3

ROLLER BEARING COMPANY OF AMERICA, P.O. Box 480, Trenton 3, N.J.
2

• **ROLLWAY BEARING COMPANY, INC.**, 541 Seymour St., Syracuse 4, N.Y.
2—3

SHAFER BEARING CORP., 901 Burlington Ave., Downers Grove, Ill.
2—3

S K F INDUSTRIES, INC., Front St. & Erie Ave., Philadelphia 32, Pa.
1—2—3

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
1

• **THE TIMKEN ROLLER BEARING CO.**, 1835 Dueber Ave., S.W., Canton 6, Ohio
2

• **THE TORRINGTON CO.**, Bantam Bearings Div., 3702 W. Sample St., South Bend 21, Ind.
1—2—3

BELT ALIGNERS

• **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

• **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio

• **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

• **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.

• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wisc.

TRANSALL, INCORPORATED, 109 N. 11th St., Birmingham 4, Ala.

BELT CONVEYORS AND ACCESSORIES (see Conveyors, Belt)

BELT CUTTERS

• **ARMSTRONG-BRAY & CO.**, 5340 Northwest Highway, Chicago 30, Ill.

• **FLEXIBLE STEEL LACING CO.**, 4607 Lexington St., Chicago 44, Ill.

BELT FASTENERS AND LACING

• **ARMSTRONG-BRAY & CO.**, 5340 Northwest Highway, Chicago 30, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

• **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.

CRESCENT BELT FASTENER CO., 480 Lexington Ave., New York 17, N.Y.

• **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.

• **FLEXIBLE STEEL LACING CO.**, 4607 Lexington St., Chicago 44, Ill.

• **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.

BELT PULLEYS (see Pulleys, Conveyors, etc.)

BELT TRIPPERS (see Conveyor Belt Trippers)

BELTING, Chain

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.

• **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.

• **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

BELTING, Heat Resistant

• **THE AMERICAN RUBBER MFG. CO.**, 1145 Park Avenue, Oakland 8, Calif.

• **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.

• **GOODALL RUBBER CO.**, 403 Whitehead Road, Trenton 4, N.J.

• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio

• **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

MAIN BELTING CO., 1241 Carpenter St., Philadelphia 47, Pa.

• **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.

• **SCANDINAVIA BELTING CO.**, 250 Central Ave., Newark 1, N.J.

BELTING, Rubber

1. Conveyor
2. Bucket Elevator
3. Power Transmission

• **THE AMERICAN RUBBER MFG. CO.**, 1145 Park Avenue, Oakland 8, Calif.
1—2—3

• **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
1

• **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.
1—2—3

THE CINCINNATI RUBBER MFG. CO., Cincinnati 12, Ohio
1—2—3

• **COLORADO FUEL & IRON CORP.**, P.O. Box 1920, Denver 1, Colo.
1

• **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
1—2—3

• **FORT WORTH STEEL & MACHINERY CO.**, 3600 McCart St., Fort Worth, Texas
1—3

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.
1—2—3

• **GOODALL RUBBER CO.**, 403 Whitehead Road, Trenton 4, N.J.
1—2—3

• **B. F. GOODRICH CO.**, Akron 11, Ohio
1—2—3

• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 Market St., Akron 16, Ohio
1—?—3

• **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.
1

• **E. LEE HEIDENREICH, JR.**, 75 Second St., Newburgh, N.Y.
1—2

• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
1—2—3

• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
1

• **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio
1—2—3

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
1—2—3

PHILADELPHIA BELTING CO., Sixth & Spring Garden Sts., Philadelphia 28, Pa.
1—2—3

• **PIONEER RUBBER MILLS**, 353 Sacramento S. San Francisco 11, Calif.
1—2—3

QUAKER RUBBER CORP., Div. of H. K. Porter Co., Inc., Tacony & Comly Streets, Philadelphia 24, Pa.
1—2—3

• **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.
1—2—3

• **W. A. RIDDELL CORP.**, Bucyrus, Ohio
1—2—3

TE-CO., INC., 801 N. Second St., St. Louis 2, Mo.
1—2—3

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.

• **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.
1—2—3

• **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.
1—2—3

BELTING, V-Type

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

• **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.

• **DODGE MFG. CORP.**, Mishawaka, Ind.

• **DURKEE-ATWOOD CO.**, 215 N.E. 7th St., Minneapolis 13, Minn.

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas

• **B. F. GOODRICH CO.**, Akron 11, Ohio

• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio

• **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

QUAKER RUBBER CORP., Div of H. K. Porter Co., Inc., Tacony & Comly Streets, Philadelphia 24, Pa.

• **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.

• **RAYBESTOS DIV. OF RAYBESTOS-MANHATTAN, INC.**, 75 East Main Street, Stratford, Connecticut

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.

• **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

BELTING, Wire

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DIRECTORY

THE CAMBRIDGE WIRE CLOTH CO., 940 Washington Blvd., Cambridge, Md.

• COLORADO FUEL & IRON CORP., P.O. Box 1920, Denver 1, Colo.

• WORTHINGTON CORPORATION, Worthington Ave., Harrison, N.J.

BENDING ROLLS, Reinforcing Steel

• QUINN WIRE & IRON WORKS, P.O. Box 549, Boone, Iowa

• U.S. STEEL SUPPLY DIV., of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

BIN AERATORS, Pneumatic

• THE BIN-DICATOR CO., 13946 Kercheval Ave., Detroit 15, Mich.

BIN GATES

• ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge 41, Mass.

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BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

• L. BURMEISTER CO., 4535 W. Mitchell St., Milwaukee 14, Wisc.

• BUTLER BIN CO., 945 Blackstone Ave., Waukesha, Wisc.

THE C. S. CARD IRON WKS. CO., P.O. Box 117, Denver 1, Colo.

• CHAIN BELT COMPANY, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.

• CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

• CONTINENTAL GIN CO., 4500 5th Ave. S., Birmingham, Ala.

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• THE HELTZEL STEEL FORM & IRON CO., Warren, Ohio

• HEWITT-ROBINS, INC., 666 Glenbrook Road, Stamford, Conn.

• IOWA MFG. CO., 916-16th St., N.E., Cedar Rapids, Iowa

• C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.

• KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N.Y.

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• MCLANAHAN & STONE CORP., 200 Wall St., Hollidaysburg, Pa.

E. F. MARSH ENGR. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.

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• MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

• PIONEER ENGR. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

RICHARDSON SCALE CO., 668-698 Van Houten Ave., Clifton, N.J.

• ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.

• SMITH ENGINEERING WORKS, 532 East Capitol Dr., Milwaukee 12, Wis.

• THE STANDARD METAL MFG. CO., Malinta, Ohio

• STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.

• SYNTRON COMPANY, 450 Lexington Ave., Homer City, Pa.

• UNIVERSAL ENGINEERING CORP., 617 C. Ave. N.W., Cedar Rapids, Iowa

• UNIVERSAL ROAD MACHINERY CO., 27 Emerick St., Kingston, N.Y.

YAUN MFG CO., Box 1508, Baton Rouge, La.

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• BUTLER BIN CO., 945 Blackstone Ave., Waukesha, Wisc.

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• ERIE STEEL CONST., P.O. Box 1031, Erie, Pa.

• FULLER COMPANY, Catasauqua, Pa.

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• THE JEFFREY MFG. CO., 935 N. Fourth St., Columbus 16, Ohio

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• F. L. SMIDTH & CO., 11 West 42nd St., New York 36, N.Y.

• STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

• SYNTRON COMPANY, 450 Lexington Ave., Homer City, Pa.

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• ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge, Mass.

• BESSER MFG. CO., Alpena, Mich.

• BLAW-KNOX CO., P.O. Box 1198, Pittsburgh 30, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

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• BUTLER BIN CO., 945 Blackstone Ave., Waukesha, Wisc.

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HARDY SCALES CO., 5701 S. Atlantic Blvd., Maywood, Calif.

• THE HELTZEL STEEL FORM & IRON CO., Warren, Ohio

• HEWITT-ROBINS, INC., 666 Glenbrook Road, Stamford, Conn.

• IOWA MFG. CO., 916-16th St., N.E., Cedar Rapids, Iowa

• THE JEFFREY MFG. CO., 935 N. Fourth St., Columbus 16, Ohio

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• THE MARIETTA CONCRETE CORP., Westview, Marietta, Ohio

• MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

RICHARDSON SCALE CO., 668-698 Van Houten Ave., Clifton, N.J.

• THE STEARNS-ROGER MFG. CO., 1720 California St., Denver 2, Colo.

• STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

• WITTEMANN MACHINERY CO., Farmingdale, N.J.

YAUN MFG. CO., Box 1508 Baton Rouge, La.

BINS, STORAGE: CONCRETE (MONOLITHIC)

• E. LEE HEIDENREICH, JR., 75 Second St., Newburgh, N.Y.

• LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

• MACDONALD ENGR. CO., 188 W. Randolph St., Chicago 1, Ill.

• MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

THE NICHOLSON CO., INC., 10 Rockefeller Plaza, New York 20, N.Y.

• THE STEARNS-ROGER MFG. CO., 1720 California St., Denver 2, Colo.

BIN, STORAGE: CONCRETE (PRECAST)

• LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

• THE MARIETTA CONCRETE CORP., Westview, Marietta, Ohio

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

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BINS, STORAGE: STEEL

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• BALDWIN-LIMA-HAMILTON CORP., Construction Equipment Div., South Main St., Lima, Ohio

• BAUGHMAN MFG. CO., INC., Shipman Road, Jerseyville, Ill.

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BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

• L. BURMEISTER CO., 4535 W. Mitchell St., Milwaukee 14, Wisc.

• BUTLER BIN CO., 945 Blackstone Ave., Waukesha, Wisc.

• CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

THE DAY COMPANY, 810 Third Ave., N.E., Minneapolis 13, Minn.

• DIAMOND IRON WORKS, INC., 1728 North 2nd St., Minneapolis 11, Minn.

• ERIE STEEL CONST., P.O. Box 1031, Erie, Pa.

GAR BRO. MFG. CO., 2415 E. Washington Blvd., Los Angeles 21, Calif.

• GENERAL AMERICAN TRANSPORTATION CORP., 135 So. LaSalle St., Chicago 90, Ill.

• GRUENDLER CRUSHER & PULV. CO., 2915 N. Market St., St. Louis 6, Mo.

• THE HELTZEL STEEL FORM & IRON CO., Warren, Ohio

• HEWITT-ROBINS, INC., 666 Glenbrook Road, Stamford, Conn.

INDUSTRIAL PROD. CO., 2705 N. Fourth St., Philadelphia 33, Pa.

IOWA MFG. CO., 916-16th St., N.E., Cedar Rapids, Iowa

• LANDIS STEEL CO., 116 West A St., P.O. Box 248, Picher, Okla.

• LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

• MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio

• PIONEER ENGR. WORKS, INC., 1515 Central Ave., Minneapolis 13, Minn.

• ROGERS IRON WORKS CO., 11th & Pearl Sts., Joplin, Mo.

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• STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

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UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

• UNIVERSAL ENGINEERING CORP., 617 C. Ave., N.W., Cedar Rapids, Iowa

• UNIVERSAL ROAD MACHINERY CO., 27 Emerick St., Kingston, N.Y.

• WILLIAMS PATENT CRUSHER & PULV. CO., 2701 No. Broadway, St. Louis 6, Mo.

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• JOY MFG. CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

THE SALEM TOOL CO., Box 235 Salem, Ohio

• STAR EXPANSION PRODUCTS CO., INC., 147 Cedar St., New York 6, New York

BITS, Drill

BRUNNER & LAY, INC., 9300 King Street, Franklin Park, Ill.

CENTRAL MINE EQUIPMENT CO., 6200 N. Broadway, St. Louis 15, Mo.

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SANDERSON CYCLONE DRILL CO., 157 S. Main St., Orrville, Ohio

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BRUNNER & LAY, INC., 9300 King Street, Franklin Park, Ill.

CENTRAL MINE EQUIPMENT CO., 6200 N. Broadway, St. Louis 15, Mo.

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• JOY MFG. CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.

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• THE TIMKEN ROLLER BEARING CO., 1835 Dueber Ave., S.W., Canton 6, Ohio

• WORTHINGTON CORPORATION, Worthington Ave., Harrison, N.J.

BITS, Drill, Grinders

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

• THE MINE & SMELTER SUPPLY CO., P.O. Box 5270--Terminal Annex, Denver 17, Colo.

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DIRECTORY

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- **ATLAS POWDER CO.**, Wilmington 99, Del.
- **E. I. DU PONT DE NEMOURS & CO., INC.**, Nemours Building, Wilmington 98, Del.
- **HERCULES POWDER CO.**, 946 King St., Wilmington, Del.

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1. Tamping
2. Vibrating

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
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- **J. W. APPLEY & SON, INC.**, 831 9th St., North, St. Petersburg 2, Fla.
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- **BESSER MFG. CO.**, Alpena, Mich.
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2
- **COLORCRETE INDUSTRIES, INC.**, 510 Ottawa Ave., Holland, Mich.
1—2
- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
1—2
- **CONCRETE EQUIPMENT CO.**, Holland, Mich.
1—2
- **CONCRETE MACHINERY CO.**, P.O. Drawer 60, Hickory, No. Car.
1
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
1—2
- **ROY DARDEN INDUSTRIES, INC.**, North Side Br. P.O. Box 95, Atlanta 3, Ga.
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1—2
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1—2
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2
- **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.
2
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
1—2

LEDEEN MFG. CO., 1600 S. San Pedro St., Los Angeles 15, Calif.
1—2

- **LITH-I-BAR CO.**, 54 W. Eighth St., Holland, Mich.
1—2

MAGIC CONCRETE EQUIP. CO., 913 S.W. 11th Ave., Miami 36, Fla.
2

THE MILES MFG. CO., 545-7 Hupp Ave., Jackson, Mich.
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- **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
1

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2

- **THE GENE OLSEN CORP.**, 401 Grace St., Adrian, Mich.
1—2
- **PRASCHAK MACHINE CO.**, Hwy. 13, South, Mashfield, Wisc.
1—2
- **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.
1—2

R. K. TYRA CO., Forest Lake, Minn.
1—2

- **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.
1

JOHN J. YELLEN, 381 Jeffries St., Perth Amboy, N.J.
2

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- **BESSER MFG. CO.**, Alpena, Mich.
- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **FLEMING MFG. CO.**, 105 Fleming Ave., Cuba, Missouri
- **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
- **M & M ENGR. CORP.**, 1017 W. 23rd St., Indianapolis 23, Ind.

THE MILES MFG. CO., 545-7 Hupp Ave., Jackson, Mich.

- **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
- **THE GENE OLSEN CORP.**, 401 Grace St., Adrian, Mich.
- **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.

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- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
- **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.
- **DODGE MFG. CORP.**, Mishawaka, Ind.

THE FAFNIR BEARING CO., Booth St., New Britain, Conn.

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas

- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **W. A. JONES FOUNDRY & MACHINE CO.**, 4401 W. Roosevelt Road, Chicago 24, Ill.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

S K F INDUSTRIES, INC., Front St., & Erie Ave., Philadelphia 32, Pa.

STANDARD PRESSED STEEL CO., Jenkintown, Pa.

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UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

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BLOCKS, Sheave and Chain

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **CONTINENTAL GIN CO.**, 4500 5th Ave., S., Birmingham, Ala.
- **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
- **SAUERMAN BROS., INC.**, 530 S. Clinton St., Chicago 7, Ill.

BLOCK SPLITTERS

- **DES PLAINES CONCRETE PROD. MACHINERY**, 930 North Ave., Des Plaines, Ill.
- **LITH-I-BAR CO.**, 54 W. Eighth St., Holland, Mich.

BLOWERS (see Fans and Blowers)

BLOW TORCHES, Heaters, Thawing Outfits for Frozen Aggregates

THE CLEVELAND CHAIN & MFG. CO., Broadway & Chaincraft Road, Cleveland 5, Ohio

HAUCK MFG. CO., 137-147 Tenth St., Brooklyn 15, N.Y.

LITTLEFORD BROS., INC., 451 E. Pearl St., Cincinnati 2, Ohio

BODIES, Ready Mixed Concrete

1. Transit Mixed
2. Non-Agitator

- **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
1
- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
1
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
1

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa.
1

DIAMOND T MOTOR CAR CO., 4401 W. 26th Street, Chicago 23, Illinois
1—2

HENNEUSE ENG. CO., Marion, Ohio
1—2

- **HERCULES STEEL PROD. CORP.**, Sherman Street, Galion, Ohio
1

IMPERIAL CONST. EQUIPMENT, 3400 Lake Street, Melrose Park, Ill.
1

- **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio
1
- **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.
1
- **THE T. L. SMITH CO.**, 2835 N. 32nd St., Milwaukee 10, Wis.
1

TRANSMISSION & GEAR CO., 10421 Haggerty Ave., Dearborn, Mich.
1—2

- **WILLARD CONCRETE MCHRY. SALES CO.**, 2906 Imperial Hway., Lynwood, Calif.
1
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
1

BODIES, Detachable Concrete Truck

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.

- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **COOK BROS. EQUIP. CO.**, 1815 N. Broadway, Los Angeles 31, Calif.

DART TRUCK CO., 2623 Oak St., Kansas City 8, Mo.

GRAMM TRAILER CORP., First Lima Building, Lima, Ohio

MFG. DIV., MAXON CONST. CO., INC., 131 No. Ludlow Street, Dayton 2, Ohio

- **ARTHUR REHBERGER & SON, INC.**, 320 Ferry St., Newark 5, N.J.
- **THE T. L. SMITH CO.**, 2835 N. 32nd St., Milwaukee 10, Wis.
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

YAUN MFG. CO., Box 1508 Baton Rouge, La.

BODIES, Dump, Dump Truck

ANTHONY COMPANY, Streator, Ill.

- **COOK BROS. EQUIP. CO.**, 1815 N. Broadway, Los Angeles 31, Calif.
- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

THE GALION ALLSTEEL BODY CO., 605 S. Market St., Galion, Ohio

- **GAR WOOD IND., INC.** Wayne Division, Wayne, Mich.

GRAMM TRAILER CORP., First Lima Building, Lima, Ohio

- **THE HEIL COMPANY**, 3000 W. Montana St., Milwaukee 1, Wisc.

HENTIEUSE ENG. CO., Marion, Ohio

- **HERCULES STEEL PROD. CORP.**, Sherman Street, Galion, Ohio

KEWANEE MFG. CO., 1052 Rock St., Kewanee, Ill.

- **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.

THE MARION METAL PROD. CO., Cheney Avenue, Marion, Ohio

NATIONAL LIFT CO., 800 Lowell St., Ypsolanti, Mich.

- **ST. PAUL HYDRAULIC HOIST**, 2207 University Ave., Minneapolis 14, Minn.

TRUCK ENGINEERING CORP., 1285 W. 70th St., Cleveland 2, Ohio

YAUN MFG. CO., Box 1508, Baton Rouge, La.

BODIES, Trailer

ATHEY PRODUCTS CO., 5631 W. 65th St., Chicago 38, Ill.

- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.
- **COOK BROS. EQUIP. CO.**, 1815 N. Broadway, Los Angeles 31, Calif.

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● **GAR WOOD IND., INC.**, Wayne Division, Wayne, Mich.

GRAMM TRAILER CORP., First Lima Building, Lima, Ohio

● **THE HEIL COMPANY**, 3000 W. Montana St., Milwaukee 1, Wisc.

● **HERCULES STEEL PROD. CORP.**, Sherman Street, Galion, Ohio

IMPERIAL CONST. EQUIPMENT, 3400 Lake Street, Melrose Park, Ill.

● **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.

MCCABE-POWERS AUTO BODY CO., 5900 No. Broadway, St. Louis 15, Mo.

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TRUCK ENGINEERING CORP., 1285 W. 70th St., Cleveland 2, Ohio

BODIES, Trailer, Bulk Cement

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● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

THE GALION ALLSTEEL BODY CO., 605 S. Market Street, Galion, Ohio

● **GAR WOOD INDUSTRIES, INC.**, Richmond Div., 4th & Wright Sts., Richmond, Calif.

GRAMM TRAILER CORP., First Lima Building, Lima, Ohio

● **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.

TRUCK ENGINEERING CORP., 1285 W. 70th St., Cleveland 2, Ohio

BODIES, Truck, Concrete Block Self-unloading

● **ARTHUR REHBERGER & SON, INC.**, 320 Ferry St., Newark 5, N.J.

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● **JOSEPH T. RYERSON & SON, INC.**, 2558 West 16th St., Chicago 80, Ill.

● **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

BOILER FEED WATER SYSTEMS

● **BAILEY METER CO.**, 1050 Ivanhoe Road, Cleveland 10, Ohio

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

BOILER INSULATION

CHICAGO FIRE BRICK CO., 1467 Elston Avenue, Chicago 22, Ill.

JOHNS-MANSVILLE, 22 E. 40th St., New York 16, N.Y.

MEXICO REFRACTORIES CO., Love & Cole Sts., Mexico, Mo.

GEORGE F. PETTINOS, INC., 1206 Locust St., Philadelphia 7, Pa.

PLIBRICO CO., 1800 N. Kingsbury St., Chicago 14, Illinois

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● **JOSEPH T. RYERSON & SON, INC.**, P.O. Box 8000-A, Chicago 80, Ill.

● **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

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● **THE BABCOCK & WILCOX CO.**, 161 W. 42nd St., New York 17, N.Y.

WM. BROS. BOILER & MFG. CO., 1057–10th Ave. S.E., Minneapolis 14, Minn.

CLEAVER-BROOKS CO., 326 E. Keefe Ave., Milwaukee 12, Wisc.

● **KENNEDY VAN SAUN MFG. & ENGR. CORP.**, 2 Park Ave., New York 16, N.Y.

MALSBARY MFG. CO., 845–92nd Ave., Oakland 3, Calif.

● **SHORE ENGINEERING CO.**, 320-322 Broadway, New York 7, N.Y.

HENRY VOGT MACHINE CO., 1000 W. Ormsby St., Louisville, Ky.

YAUN MFG. CO., Box 1508, Baton Rouge, La.

BOILERS, Waste Heat

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BOOSTERS, Voltage, Motor Generator

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● **GENERAL ELECTRIC CO.**, 1 River Rd., Schenectady 5, N.Y.

LEDEEN MFG. CO., 1600 S. San Pedro St., Los Angeles 15, Calif.

BRAKE LINING

● **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.

● **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio

● **GREY-ROCK DIV.**, Raybestos-Manhattan, Inc., Manheim, Pa.

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N.Y.

● **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.

● **RAYBESTOS DIV. OF RAYBESTOS-MANHATTAN, INC.**, 75 East Main Street, Stratford, Connecticut

SCANDINAVIA BELTING CO., 250 Central Ave., Newark 1, N.J.

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THE S. K. WELLMAN CO., 200 Egbert Rd., Bedford, Ohio

BRAKES

1. Clutch
2. Hydraulic
3. Magnetic

● **DYNAMATIC CORP.**, 3307 14th Ave., Kenosha, Wis.
3

THE ELECTRIC CONTROLLER & MFG. CO., 2700 East 79th Street, Cleveland 4, Ohio
3

FEDERAL MOTOR TRUCK DIV., Federal Fawick Corp., 5780 Federal Ave., Detroit 9, Mich.
2

● **GENERAL ELECTRIC CO.**, 1 River Rd., Schenectady 5, N.Y.
3

● **M & M ENGR. CORP.**, 1017 W. 23rd St., Indianapolis 23, Ind.
1—2

● **STEARNS MAGNETIC, INC.**, 675 S. 28th St., Milwaukee 46, Wis.
1—3

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1. Concrete
2. Sand-Lime

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2

● **J. W. APPLEY & SON, INC.**, 831 9th St., North, St. Petersburg 2, Fla.
1

● **BESSER MFG. CO.**, Alpena, Mich.
1

● **CARBOLOY DEPT. OF G.E. CO.**, 11177 E. Eight Mile Road, Detroit 32, Mich.
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1

● **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
1—2

● **W. E. DUNN MFG. CO.**, Holland, Michigan
1

● **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.
1

● **JACKSON & CHURCH CO.**, 321 N. Hamilton St., Saginaw, Mich.
2

● **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
2

● **LITH-I-BAR CO.**, 54 W. Eighth St., Holland, Mich.
1

● **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
1—2

● **THE GENE OLSEN CORP.**, 401 Grace St., Adrian, Mich.
1

● **W. A. RIDDELL CORP.**, Bucyrus, Ohio
1—2

● **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.
1

R. K. TYRA CO., Forest Lake, Minn.
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● **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah

● **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.

● **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.

● **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.

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● **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.

● **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.

BUCKET LIPS & TEETH

ALLIED STEEL & TRACTOR PRODUCTS, INC., 7835 Broadway, Cleveland 5, Ohio

● **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.

● **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

● **J. W. APPLEY & SON, INC.**, 831 9th St. North, St. Petersburg 2, Fla.

● **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

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● **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.

● **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

● **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.

● **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.

● **PARSONS CO.**, Newton, Ia.

● **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.

● **WELLMAN ENGINEERING CO.**, 7000 Central Ave., Cleveland 4, Ohio

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2. Dragline & Slackline
3. Dredge & Excavator
4. Elevator
5. Grapple
6. Skip
7. Tramway
8. Tractor Loader

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8

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3

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6

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.
3

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4—6

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4

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.
2—4—6

● **BESSER MFG. CO.**, Alpena, Mich.
5

● **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
1—5

● **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.
1—2—3—5—6—8

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4

THE C. S. CARD IRON WKS. CO., P.O. Box 117, Denver 1, Colo.
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• DIAMOND IRON WORKS, INC., 1728 North 2nd St., Minneapolis 11, Minn.
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4—5—6—7

• ERIE STEEL CONST., P.O. Box 1031, Erie, Pa.
4

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas
4

• THE FROG, SWITCH & MFG. CO., Carlisle, Pa.
1—2—3

• GEO HAISS MFG. CO., INC., Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.
1—2—3

• HARNISCHFEGER CORP., 4400 W. National Ave., Milwaukee 46, Wisc.
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• THE HAYWARD CO., 202-204 Fulton St., New York, N.Y.
1—2—3—5

• HENDRICK MFG. CO., Dundaff Street, Carbondale, Pa.
4—5

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2

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8

ISAACSON IRON WORKS, 2917 E. Marginal Way, Seattle 14, Wash.
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• THE JEFFREY MFG. CO., 935 N. Fourth St., Columbus 16, Ohio
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• KENSINGTON STEEL CO., 505 Kensington Ave., Chicago 28, Ill.
4

• LINK-BELT COMPANY, 307 N. Michigan Ave., Chicago 1, Ill.
4—5—6

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• STEARNS MFG. CO., INC., Beecher St., Adrian, Mich.
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• TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N.J.
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8

THOMBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N.J.
4

• UNIVERSAL ENGINEERING CORP., 617 C. Ave. N.W., Cedar Rapids, Iowa
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• UNIVERSAL ROAD MACHINERY CO., 27 Emerick St., Kingston, N.Y.
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• WELLMAN ENGINEERING CO., 7000 Central Ave., Cleveland 4, Ohio
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• YUBA MFG. CO., 351 California St., San Francisco 4, Calif.
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TRUSCON STEEL DIV., Republic Steel Corp., Albert St., Youngstown 1, Ohio

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• KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N.Y.

• THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio

• LANDIS STEEL CO., 116 West A St., P.O. Box 248, Picher, Okla.

• REPUBLIC RUBBER DIV., Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

• LIPPMANN ENGINEERING WORKS, 4603 W. Witchell St., Milwaukee 14, Wis.

• MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio

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• THE HEIL COMPANY, 3000 W. Montana St., Milwaukee 1, Wisc.

HENNEUSE ENG. CO., Marion, Ohio

• THE FRANK G. HOUGH CO., 939 Sunnyside Ave., Libertyville, Ill.

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• R. G. LeTOURNEAU, INC., 2301 North Adams, Peoria 3, Ill.

MAINE STEEL, INC., 169 Front St., So. Portland 7, Maine

• MIXERMOBILE MFRS., 8027 N.E. Killingsworth, Portland 16, Ore.

• THE OLIVER CORP., 400 W. Madison St., Chicago 6, Ill.

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TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.

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• F. L. SMIDTH & CO., 11 West 42nd St., New York 36, N.Y.

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C

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• R. G. LeTOURNEAU, INC., 2301 North Adams, Peoria 3, Ill.

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• SAUERMAN BROS. INC., 530 S. Clinton St., Chicago 7, Ill.

STREET BROS. MACHINE CO., INC., 415 Dome Bldg., Chattanooga, Tenn.

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CALCIUM CHLORIDE INSTITUTE, 909 Ring Building, Washington 6, D.C.

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• SOLVAY PROCESS DIV., Allied Chemical & Dye Corp., 61 Broadway, New York 6, N.Y.

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WYANDOTTE CHEMICALS CORP., Michigan Alakli Div., Wyandotte, Mich.

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ADVANCE CAR-MOVER CO., INC., 112 N. Outagamie St., Appleton, Wis.

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CLYDE IRON WORKS, INC., Duluth 1, Minn.

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GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.

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SUPERIOR-LIDGERWOOD-MUNDY CORP., 1101 John Ave., Superior, Wis.

CAR SHAKERS

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● **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

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● **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

● **SYNTRON COMPANY**, 450 Lexington Ave., Homer City, Pa.

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● **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.

THE CHASE FOUNDRY & MFG. CO., 2300 Parsons Avenue, Columbus 7, Ohio

● **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

● **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio

CARS, Dump

● **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.

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THE CHASE FOUNDRY & MFG. CO., 2300 Parsons Avenue, Columbus 7, Ohio

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PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.

J. C. STEELE & SONS, INC., P.O. Box 951, Statesville, N.C.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

CARS, Electric, Remote Control

THE ATLAS CAR & MFG. CO., 1140 Ivanhoe Road, Cleveland 10, Ohio

● **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

CARS, Mine, Quarry, Industrial

● **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.

BETHLEHEM STEEL CO., Third Street, Bethlehem, Pa.

THE C. S. CARD IRON WKS. CO., P.O. Box 117, Denver 1, Colo.

● **DENVER EQUIPMENT CO.**, 1400 17th Street P.O. Box 5268, Denver 17, Colo.

● **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.

● **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

CARS, Railroad, Retaining Doors, Strapping

PULLMAN-STANDARD CAR MFG. CO., 79 E. Adams Street, Chicago 3, Ill.

CARTRIDGES, Rotary, Kiln, Slag Removal

● **E. I. DU PONT DE NEMOURS & CO., INC.**, Nemours Building, Wilmington 98, Del.

INDUSTRIAL SALES DIVISION OF REMINGTON ARMS CO., INC., 939 Barnum Ave., Bridgeport 2, Conn.

CASTINGS, Repair Parts

1. Bronze
2. Grey Iron
3. Heat Resisting Steel
4. Malleable
5. Manganese
6. Special Alloy
7. Steel

● **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
1—2—6

● **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
1—2—3—5—6

● **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
5

● **J. W. APPLEY & SON, INC.**, 831 9th St. North, St. Petersburg 2, Fla.
1—2—7

● **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.
2—3—4—7

● **BIRDSBORO STEEL FOUNDRY & MACHINE CO.**, Birdsboro, Pa.
6—7

● **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
2—4

THE CLEVELAND CHAIN & MFG. CO., Broadway & Chaincraft Road, Cleveland 5, Ohio
6

● **CONCRETE MACHINERY CO.**, P.O. Drawer 60, Hickory, No. Car.
2—6

● **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.
2

DAVENPORT BESLER CORP., 2305 Rockingham Road, Davenport, Iowa
2

● **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
2

● **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
2—6

THE FALK CORP., 3001 W. Canal St., Milwaukee 8, Wisc.
7

● **FARREL-BIRMINGHAM CO., INC.**, Ansonia, Conn.
2

● **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
4—5

● **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
6

HAYNES STELLITE CO., Div. of Union Carbide & Carbon Co., So. Lindsay Street, Kokomo, Indiana
6

● **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
2

● **IOWA MFG. CO.**, 916-16th St., N.E., Cedar Rapids, Iowa
2

● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
2—3—4

● **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
2

● **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
4—5—6

● **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
2—4—6—7

● **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
1—2—6

MIR-O-COL ALLOY CO., INC., 340 N. Avenue 21, Los Angeles 31, Calif.
6

● **NATIONAL BEARING DIV. OF AMER. BRAKE SHOE CO.**, 4930 Manchester Ave., St. Louis 10, Mo.
1

THE PENNEBACKER CO., 3rd & Furnace Sts., Emmaus, Pa.
2—6

● **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
5—6

● **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
2

● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
1—2—3—4—5—6—7

● **STAR EXPANSION PRODUCTS CO., INC.**, 147 Cedar St., New York 6, N.Y.
6

● **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.
2—6

● **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
3

● **STOODY COMPANY**, 11929 E. Slauson Ave., Whittier, Calif.
6

● **STROH PROCESS STEEL CO.**, 1428 High St. N.S. Pittsburgh 12, Pa.
6

● **STULZ-SICKLES COMPANY**, 141 Lafayette St., Newark 5, N.J.
5

● **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
5—6

TEXAS FOUNDRIES, INC., P.O. Box 180, 1611 N. Raguet, Lufkin, Texas
3

● **THOMAS FOUNDRIES, INC.**, P.O. Box 1111, Birmingham 1, Ala.
2—6

● **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
6

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.
2

● **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.
7

● **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.
2—3—4—5

● **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.
1—2

CEMENT

LONE STAR CEMENT CORP., 100 Park Ave., New York 17, N.Y.

PENN-DIXIE CEMENT CORP., 60 E. 42nd St., New York 17, N.Y.

● **TRINITY DIV. OF GENERAL PORTLAND CEMENT CO.**, 111 W. Monroe St., Chicago 3, Ill.

● **UNIVERSAL ATLAS CEMENT CO.**, 100 Park Avenue, New York 17, N.Y.

CEMENT COOLERS (see Coolers, Bulk Cement)

CEMENT DISPERSION AGENTS

● **DEWEY AND ALMY CHEMICAL CO.**, 62 Whittemore Ave., Cambridge 40, Mass.

A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N.Y.

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

- **THE MASTER BUILDERS CO.**, Sub. of American-Marietta Co., Cleveland 3, Ohio

MINERAL PIGMENTS CORP., Washington Blvd., Muirkirk, Md.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N.J.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

SPRAY-O-BOND COMPANY, 2225 N. Humboldt, Milwaukee 12, Wis.

CEMENT AND MASONRY COLORS

CHASE CONCRETE MACHINERY CO., 94 Grandview Ave., Buffalo 23, N.Y.

- **COLORCRETE INDUSTRIES, INC.**, 510 Ottawa Ave., Holland, Mich.
- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.

A. C. HORN CO., INC., 10th St., & 44th Ave., Long Island City 1, N.Y.

- **KAISER ALUMINUM & CHEMICAL SALES, INC.**, 1924 Broadway, Oakland, Calif.
- **LANDERS-SEGAL COLOR CO.**, 78 Delevan St., Brooklyn 31, N.Y.
- **THE MASTER BUILDERS CO.**, Sub. of American Marietta Co., Cleveland 3, Ohio

MINERAL PIGMENTS CORP., Washington Blvd., Muirkirk, Md.

THE REARDON COMPANY, 7501 Page Avenue, St. Louis 14, Mo.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

J. LEE SMITH & CO., INC., 25 Ann Street, New York 38, N.Y.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

TAMMS INDUSTRIES, INC., 228 N. LaSalle St., Chicago 1, Ill.

- **C. K. Williams & Co.**, 640 N. 13th St., Easton, Pa.

CEMENT PLANTS, Engineers & Contractors

- **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.

CROSBY CONSTRUCTION CO., 185 No. Wabash Ave., Chicago 1, Ill.

- **E. LEE HEIDENREICH, JR.**, 75 Second St., Newburgh, N.Y.
- **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
- **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
- **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **MACDONALD ENGR. CO.**, 188 W. Randolph St., Chicago 1, Ill.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- **SEPARATION PROCESS CO.**, Fuller Building, Catasauqua, Pa.
- **F. L SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.

CEMENT PUMPS, Finished Cement (see Pumps, Cement)

CEMENT TESTING APPARATUS

AMERICAN INSTRUMENT CO., INC., Silver Spring, Md.

CENTRAL SCIENTIFIC CO., 1700 Irving Park Road, Chicago 13, Ill.

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

PRECISION SCIENTIFIC CO., 3737 W. Cortland St., Chicago 47, Ill.

CENTRAL MIXING PLANTS, Concrete

- **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

- **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
- **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
- **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **MIXERMOBILE MFRS.**, 8027 N.E. Killingsworth, Portland 16, Ore.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

CENTRIFUGES, Cement Slurry, etc.

PRECISION SCIENTIFIC CO., 3737 W. Cortland St., Chicago 47, Ill.

- **SEPARATION PROCESS CO.**, Fuller Building, Catasauqua, Pa.

CHAIN, Dredge and Shovel

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN CHAIN DIV.**, American Chain & Cable Co., Inc., York, Pa.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

THE CLEVELAND CHAIN & MFG. CO., Broadway & Chaincraft Road, Cleveland 5, Ohio

- **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **U.S. STEEL SUPPLY DIV.** of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

CHAIN DRIVES (see Drives)

CHAIN, Elevating and Conveying

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.

THE CLEVELAND CHAIN & MFG. CO., Broadway & Chaincraft Road, Cleveland 5, Ohio

DIAMOND CHAIN CO., INC., 402 Kentucky Ave., Indianapolis 7, Ind.

- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **U.S. STEEL SUPPLY DIV.** of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.
- **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.

CHAIN, Heat Exchanger

- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

CHAIN LINKS, Fittings, Hooks, etc.

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN CHAIN DIV.**, American Chain & Cable Co., Inc., York, Pa.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

THE CLEVELAND CHAIN & MFG. CO., Broadway & Chaincraft Road, Cleveland 5, Ohio

- **THE THOMAS LAUGHLIN CO.**, 143 Fore Street, Portland 6, Maine
- **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

CHAINS, Drag

- **AMERICAN CHAIN DIV.**, American Chain & Cable Co., Inc., York, Pa.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

- **CHAIN BELT COMPANY** 4649 W. Greenfield Ave., Milwaukee 1, Wisc.

THE CLEVELAND CHAIN & MFG. CO., Broadway & Chaincraft Road, Cleveland 5, Ohio

- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.

CHUTE LININGS, Rubber

- **THE AMERICAN RUBBER MFG. CO.**, 1145 Park Avenue, Oakland 8, Calif.
- **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.

THE CINCINNATI RUBBER MFG. CO., Cincinnati 12, Ohio

- **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah
- **GOODALL RUBBER CO.**, 403 Whitehead Road, Trenton 4, N.J.
- **B. F. GOODRICH CO.**, Akron 11, Ohio
- **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

MAGIC CHEMICAL CO., 131 Crescent St., Brockton 2, Mass.

- **PIONEER RUBBER MILLS**, 353 Sacramento St., San Francisco 11, Calif.

QUAKER RUBBER CORP., Div. of H. K. Porter Co., Inc., Tacony & Comly Streets, Philadelphia 24, Pa.

- **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.
- **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.

CHUTE LININGS, Other

ALLIED STEEL & TRACTOR PRODUCTS, INC., 7835 Broadway, Cleveland 5, Ohio

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
- **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N.Y.

- **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
- **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **THOMAS FOUNDRIES, INC.**, P.O. Box 1111, Birmingham 1, Ala.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

- **U.S. STEEL SUPPLY DIV.** of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

CHUTES

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

- **BAUGHMAN MFG. CO., INC.**, 1000 Shipman Rd., Jerseyville, Ill.
- **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.

- **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
- **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
- **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

HARDY SCALES CO., 5701 S. Atlantic Blvd., Maywood, Calif.

- **HENDRICK MFG. CO.**, Dundaff Street, Carbondale, Pa.

IMPERIAL CONST. EQUIPMENT, 3400 Lake Street, Melrose Park, Ill.

- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.

MCNALLY PITTSBURG MFG. CORP., 307 W. 3rd Street, Pittsburg, Kansas

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

• **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.

• **THE STANDARD METAL MFG. CO.**, Malinta, Ohio

R. K. TYRA CO., Forest Lake, Minn.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

CHUTES, Spiral

ROBERT HOLMES & BROS., INC., 3519 Junction Ave., Danville, Ill.

CIRCUIT BREAKERS, Electric

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

CIRCUIT TESTERS, Electric

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

CLARIFIERS, AIR (see Air Filters)

CLARIFIERS, Oil (see Air Filters)

CLASSIFIERS

1. Air
2. Electrostatic
3. Hydraulic

• **COLORADO IRON WORKS CO.**, 1624—17th Street, Denver 2, Colo.
3

• **COMBUSTION ENGR.-SUPERHEATER, INC.**, Raymond Pulverizer Div., 1319 N. Branch St., Chicago 22, Ill.
1

• **THE DEISTER CONCENTRATOR CO.**, 901 Glasgow Avenue, Fort Wayne 1, Indiana
3

• **DEISTER MACHINE CO.**, 1933 E. Wayne St., Fort Wayne 4, Ind.
3

• **THE DORR CO., ENGRS.**, Barry Place, Stamford, Conn.
3

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
1—3

• **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
1

• **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.
3

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.
3

THE SINK & FLOAT DIV., C. Tennant, Sons & Co., of N.Y., 100 Park Ave., New York 17, N.Y.
1—2—3

• **SMITH ENGINEERING WORKS**, 532 East Capitol Dr., Milwaukee 12, Wis.
1—2—3

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
1

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
1—2

• **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
1

• **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.
3

CLASSIFIERS, SAND (see Sand Recovery Machinery)

CLEANING MACHINES, Bag (see Bag Cleaners)

CLINKER COOLERS

1. Grate
2. Rotary

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
1—2

• **FULLER COMPANY**, Catasauqua, Pa.
1

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
1—2

• **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
2

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
2

• **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
2

• **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio
1—2

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
1—2

• **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
2

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.
2

• **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.
2

CLIPS, WIRE ROPE (see Wire Rope Fittings)

CLOTH, WIRE (see Wire Cloth)

CLUTCH FACINGS (see Brake Linings)

CLUTCHES

AMERICAN BLOWER CORP., Detroit 32, Mich.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

• **DODGE MFG. CORP.**, Mishawaka, Ind.

• **DYNAMATIC CORP.**, 3307 14th Ave., Kenosha, Wis.

• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

• **STEARNS MAGNETIC INC.**, 675 S. 28th St., Milwaukee 46, Wis.

J. C. STEELE & SONS, INC., P.O. Box 951, Statesvil'e, N.C.

COAL PULVERIZING EQUIPMENT

• **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

• **THE BABCOCK & WILCOX CO.**, 161 W. 42nd St., New York 17, N.Y.

• **COMBUSTION ENGR.-SUPERHEATER, INC.**, Raymond Pulverizer Division, 1319 N. Branch St., Chicago 22, Ill.

• **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa

• **GRUENDLER CRUSHER & PULV. CO.**, 2915 N. Market St., St. Louis 6, Mo.

• **HAMMERMILLS, INC., DIV. PETTIBONE MULLIKEN CORP.**, 4710 W. Division St., Chicago 51, Ill.

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.

• **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.

• **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa

• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

McNALLY PITTSBURG MFG. CORP., 307 W. 3rd Street, Pittsburg, Kansas

• **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

WHITING CORPORATION, 157th & Lathrop, Harvey, Ill.

• **WILLAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.

COAL PULVERIZING EQUIPMENT, Direct-Firing Unit Mills

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

• **THE BABCOCK & WILCOX CO.**, 161 W. 42nd St., New York 17, N.Y.

• **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio

• **COMBUSTION ENGR.-SUPERHEATER, INC.**, Raymond Pulverizer Div. 1319 N. Branch St., Chicago 22, Ill.

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

• **THE STRONG-SCOTT MFG. CO.**, 451 Taft St., N.E., Minneapolis 13, Minn.

WHITING CORPORATION, 157th & Lathrop, Harvey, Ill.

COLORS, Cement (see Cement and Masonry Colors)

COMMUNICATIONS SYSTEMS

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

CONCENTRATING TABLES

• **THE DEISTER CONCENTRATOR CO.**, 901 Glasgow Ave., Fort Wayne 1, Ind.

• **DEISTER MACHINE CO.**, 1933 E. Wayne St., Fort Wayne 4, Ind.

• **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.

• **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

• **SEPARATION PROCESS CO.**, Fuller Building, Catasauqua, Pa.

CONCRETE BLOCK MACHINES (see Block Machines)

CONCRETE CONTROL SYSTEMS, Quality

• **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio

• **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

• **M & M ENGR. CORP.**, 1017 W. 23rd St., Indianapolis 23, Ind.

• **OSWALT ENGINEERING CO.**, 1335 Circle, Forest Park, Ill.

SCIENTIFIC CONCRETE SERVICE CORP., 724 Salem Ave., Elizabeth 3, N.J.

CONCRETE, Dry-Batched

SAKRETE, INC., Fisher Ave. & B & O R. R., Cincinnati 17, Ohio

CONCRETE MASONRY REINFORCING

• **THE CARTER-WATERS CORP.**, 2440 Pennway, Kansas City 8, Mo.

A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N.Y.

TRUCSON STEEL DIV., Republic Steel Corp., Albert St., Youngstown 1, Ohio

CONCRETE MASONRY, Coating Machinery

• **THE KRETE-KOATER SERVICE**, Concrete Coating Machines, Hillsboro, Ill.

CONCRETE MIXERS

1. Block Plant
2. Continuous
3. Job, Portable

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2—3

• **J. W. APPLEY & SON, INC.**, 831 9th St. North, St. Petersburg 2, Fla.
1—3

• **BESSER MFG. CO.**, Alpena, Mich.
1

• **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
1

• **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
3

CHASE CONCRETE MACHINERY CO., 94 Grandview Ave., Buffalo 23, N.Y.
1

• **COLORCRETE INDUSTRIES, INC.**, 510 Ottawa Ave., Holland, Mich.
1

• **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
1

• **CONCRETE MACHINERY CO.**, P.O. Box 2248, Hickory, N.C.
2

• CONCRETE EQUIPMENT CO., Holland, Mich.
1

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
1

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa
3

• **DES PLAINES CONCRETE PROD. MACHINERY**, 930 North Ave., Des Plaines, Ill.
1

• **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
1—2—3

• **FLEMING MFG. CO.**, 105 Fleming Ave., Cuba, Missouri
1

• **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.
1

• **GILSON BROTHERS CO.**, Fredonia, Wisc.
3

HENNEUSE ENG. CO., Marion, Ohio
3

• **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio
3

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DIRECTORY

● **J. A. JONES CONCRETE MACHINERY CO.**, 108 Horning Road, Pittsburgh 34, Pa.
1—2

● **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
1—2

● **THE KNICKERBOCKER CO.**, 603 Liberty St., Jackson, Mich.
3

● **KWIK MIX COMPANY**, Port Washington, Wisc.
3

● **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.
1—2—3

● **LITH-I-BAR CO.**, 54 W. Eighth St., Holland, Mich.
1

MISHCO CORP., 615 S.W. 2nd Ave., Miami, Fla.
1

● **MIXERMOBILE MFRS.**, 8027 N.E. Killingsworth, Portland 16, Ore.
3

● **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
1—2—3

● **THE GENE OLSEN CORP.**, 401 Grace St., Adrian, Mich.
1

● **PRASCHAK MACHINE CO.**, Hwy. 13, South, Marshfield, Wisc.
1

● **THE T. L. SMITH CO.**, 2835 N. 32nd St., Milwaukee 10, Wis.
3

● **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.
1

R. K. TYRA CO., Forest Lake, Minn.
1

UNIVERSAL CONCRETE MACHINERY CO., INC., 297 So. High St., Columbus 15, Ohio
1

● **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.
1

● **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
1—2—3

CONCRETE MIXERS, Truck (see Bodies, Ready Mixed Concrete)

CONCRETE MIXING PLANTS (see Central Mixing Plants)

CONCRETE PAINTS AND COATINGS

AMERICAN FLURESIT CO., INC., 4011 Red Bank Rd., Cincinnati 27, Ohio

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A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N.Y.

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MEDUSA PORTLAND CEMENT CO., 100 Midland Bldg., Cleveland 15, Ohio

SAKRETE, INC., P.O. Box 11, Cincinnati 17, Ohio

● **THE SHERWIN-WILLIAMS COMPANY**, General Industrial Div., Cleveland 1, Ohio

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N.J.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

SPRAY-O-BOND COMPANY, 2225 N. Humboldt, Milwaukee 12, Wis.

STANDARD OIL COMPANY OF CALIF., 225 Bush St., San Francisco 20, Calif.

TAMMS INDUSTRIES, INC., 228 N. LaSalle St., Chicago 1, Ill.

TRUSCON LABORATORIES, Milwaukee Jct. P.O., Detroit 11, Mich.

CONCRETE PREMIX PLANTS, Dry

● **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.

● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

● **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.

SAKRETE, INC., P.O. Box 11, Cincinnati 17, Ohio

CONCRETE PRODUCTS CURING EQUIPMENT (see Kilns, Concrete Curing)

CONCRETE PRODUCTS HANDLING EQUIPMENT

● **J. W. APPLEY & SON, INC.**, 831 9th North St., North, St. Petersburg 2, Fla.

● **BARBER-GREENE CO.**, 631 W. Park Ave., Aurora, Ill.

● **WM. BROS. BOILER & MFG. CO.**, 1057 10th Ave. S.E., Minneapolis 14, Minn.

● **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.

● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

● **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.

● **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

GAR BRO. MFG. CO., 2415 E. Washington Blvd., Los Angeles 21, Calif.

● **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.

● **INSLEY MFG. CORP.**, 801 N. Olney St., Indianapolis 6, Ind.

● **JACKSON & CHURCH CO.**, 321 N. Hamilton St., Saginaw, Mich.

● **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

● **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio

THE PRIME-MOVER CO., Muscatine, Iowa

● **SERVICE CASTER & TRUCK CORP.**, Albion, Mich.

CONCRETE SPECIALTY FORMS

A. Bins, Tanks, Silos
1. **Burial Vault**
2. **Cribbing**
3. **Curb & Gutter**
4. **Fence Posts & Poles**
5. **Floor System**
6. **Floor & Roof Slab**
7. **Garbage Disposal Unit**
8. **Garden & Ornamental Furniture**
9. **Joist**
10. **Laundry Tray**
11. **Manhole, Curbing & Blocks**
12. **Partition**
13. **Pipe, Culvert & Sewer**
14. **Septic Tank**
15. **Sill & Lintel**
16. **Step, Precast**
17. **Tile & Conduit**
18. **Walls, Foundation**

A & T DEVELOPMENT CORP., Fischer Ave., at B & O R.R., Cincinnati 17, Ohio
5—6—18

AMERICAN VAULT CO., 579 Kenilworth, Detroit 2, Mich.
1—7—14

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
15

● **J. W. APPLEY & SON, INC.**, 831 9th St., North, St. Petersburg 2, Fla.
9—11—14—15

ASHLAND VAULT, INC., 500-518 Virginia Ave., Ashland 4, Ohio
1—14

THE AUTOMATIC SEALING VAULT CO., Peru, Indiana
1—14

● **BERG VAULT COMPANY**, 1620 Lucas Hunt Rd., St. Louis 20, Mo.
1—14

● **BESSER MFG. CO.**, Alpena, Mich.
11

BUFFALO WILBERT VAULT WORKS, 338 Scajaquada St., Buffalo 11, N.Y.
1—7

● **CARPENTER MFG. CO.**, R.F.D., No. 1, Box 470, Richmond 23, Va.
14

CHASE CONCRETE MACHINERY CO., 94 Grandview Ave., Buffalo 23, N.Y.
1—4—8—14—15—16

● **COLORCRETE INDUSTRIES, INC.**, 510 Ottawa Ave., Holland, Mich.
8—15

● **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
6—11—12—14—15—17—18

● **CONCRETE EQUIPMENT CO.**, Holland, Mich.
8

● **CONCRETE MACHINERY CO.**, P.O. Drawer 60, Hickory, No. Car.
8—13—14—17

● **CONCRETE PIPE MACHINERY CO.**, P.O. Box 1708, Sioux City 2, Iowa
13—17

● **CURRIER'S**, 3308 Vanowen St., Burbank, Calif.
4

● **DES PLAINES CONCRETE PROD. MACHINERY**, 930 North Ave., Des Plaines, Ill.
8—11

● **THE FLEXICORE CO., INC.**, East Monument Ave., Box 825, Dayton 1, Ohio
5

● **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.
8

● **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
3—11

IRVINGTON FORM & TANK CORP., 20 Vesey Street, New York, N.Y.
11—18

● **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
15

● **LITH-I-BAR CO.**, 54 W. Eighth St., Holland, Mich.
5—9—11—12—14—15—18

METAL FORMS CORP., 3334 N. Booth St., Milwaukee 12, Wisc.
A—3—11—18

● **QUINN WIRE & IRON WORKS**, P.O. Box 549, Boone, Iowa
11—13—14

● **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
13

SYMONS CLAMP & MFG CO., 4249 Diversey Ave., Chicago 39, Ill.
6—18

TEXAS FOUNDRIES, INC., P.O. Box 180, 1611 N. Raguet, Lufkin, Texas
13

R. K. TYRA CO., Forest Lake, Minn.
A—2—3—4—8—9—11
12—13—14—15—16

UNIVERSAL CONCRETE MACHINERY CO., INC., 297 So. High St., Columbus 15, Ohio
13—17

CONCRETE SPECIALTY MACHINES

1. **Chimney & Flue Block**
1A. **Drain Tile**
2. **Fence Posts**
3. **Joist & Slab**
3A. **Ornamental Fence Blocks**
4. **Pipe, Culvert & Sewer**
5. **Roof Tile**
6. **Sill & Lintel**
7. **Silo Stave**
8. **Tile & Conduit**

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1

● **J. W. APPLEY & SON, INC.**, 831 9th St. North, St. Petersburg 2, Fla.
1—3—4—6

BARTILE CORP. OF AMERICA, 1930 Wilshire Blvd., Suite 204, Los Angeles 5, Calif.
5

● **BESSER MFG. CO.**, Alpena, Mich.
1—5—6—7

CHASE CONCRETE MACHINERY CO., 94 Grandview Ave., Buffalo 23, N.Y.
2—6

● **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
1—2—3—4—5—6—7—8

● **CONCRETE EQUIPMENT CO.**, Holland, Mich.
8

● **CONCRETE MACHINERY CO.**, P.O. Drawer 60, Hickory, No. Car.
2—4—8

● **CONCRETE PIPE MACHINERY CO.**, P.O. Box 1708, Sioux City 2, Iowa
4—8

● **W. E. DUNN MFG. CO.**, Holland, Michigan
3—5

● **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.
1—6—7

● **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
2—6

● **LITH-I-BAR CO.**, 54 W. Eighth St., Holland, Mich.
1—3—6

● **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
1

● **THE GENE OLSEN CORP.**, 401 Grace St., Adrian, Mich.
1—7

● **PRASCHAK MACHINE CO.**, Hwy. 13, South, Marshfield, Wisc.
7

● **QUINN WIRE & IRON WORKS**, P.O. Box 549, Boone, Iowa
4

● **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.
1—7

TEXAS FOUNDRIES, INC., P.O. Box 180, 1611 N. Raguet, Lufkin, Texas
4

R. K. TYRA CO., Forest Lake, Minn.
1—2—3—4—6

UNIVERSAL CONCRETE MACHINERY CO., INC., 297 So. High St., Columbus 15, Ohio
4

JOHN J. YELLEN, 381 Jeffries St., Perth Amboy, N.J.
1

CONCRETE WATERPROOFING AND DAMPPROOFING

AMERICAN BITUMULS & ASPHALT CO., 200 Bush St., San Francisco 4, Calif.

AMERICAN FLURESIT CO., INC., 4011 Red Bank Rd., Cincinnati 27, Ohio

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MEDUSA PORTLAND CEMENT CO., 1000 Midland Bldg., Cleveland 15, Ohio

PHILADELPHIA QUARTZ CO., 1146 Public Ledger Bldg., Philadelphia 6, Pa.

THE REARDON COMPANY, 7501 Page Avenue, St. Louis 14, Mo.

REARDON INDUSTRIES, INC., 2837 Stanton Ave., Cincinnati 6, Ohio

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N.J.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

SPRAY-O-BOND COMPANY, 2225 N. Humboldt, Milwaukee 12, Wis.

STANDARD OIL COMPANY OF CALIF., 225 Bush St., San Francisco 20, Calif.

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CONDUIT, Electrical

● **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N.Y.

REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio

CONTROL SYSTEMS

1. Draft
2. Pressure
3. Temperature

● **THE BABCOCK & WILCOX CO.**, 161 W. 42nd. St., New York 17, N.Y.
1—2—3

● **BAILEY METER CO.**, 1050 Ivanhoe Road, Cleveland 10, Ohio
1—2—3

THE BRISTOL CO., Waterbury 20, Conn.
1—2—3

CHAMPION FUEL ENGINE DIV., P.O. Box 3941, Detroit 27, Mich.
1—2—3

THE FOXBORO CO., 38 Neponset Ave., Foxboro, Mass.
1—2—3

THE HAYS CORP., Michigan City, Ind.
1—2

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.
1—2—3

● **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
3—4—5—6—8—9—10—11

● **M & M ENGR. CORP.**, 1017 W. 23rd St., Indianapolis 23, Ind.
1—2—3

C. A. NORGREN CO., 3400 S. Elati St., Englewood, Colo.
2

● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
1—2

CONTROLS, Bin and Tank Level

● **THE BIN-DICATOR CO.**, 13946 Kercheval Ave., Detroit 15, Mich.

● **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.

THE FOXBORO CO., 38 Neponset Ave., Foxboro, Mass.

● **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio

● **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

● **SYNTRON COMPANY**, 450 Lexington Ave., Homer City, Pa.

CONVERTERS, Electric

● **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

● **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

CONVEYOR BELT TRIPPERS

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THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

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● **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.

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● **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa

● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio

● **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

● **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

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● **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

TRANSALL, INCORPORATED, 109 N. 11th St., Birmingham 4, Ala.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

● **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa

CONVEYOR IDLERS, Belt

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BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

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THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

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● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio

● **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

● **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

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● **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

● **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.

● **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.

● **THE STANDARD METAL MFG. CO.**, Malinta, Ohio

● **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

TRANSALL, INCORPORATED, 109 N. 11th St., Birmingham 4, Ala.

● **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa

CONVEYORS, Materials Handling

1. Aeration
2. Air
3. Apron
4. Belt
5. Belt, Portable
6. Drag
7. Overhead Bridge
8. Pan
9. Screw
10. Vibrating
11. Weight Recording

AJAX FLEXIBLE COUPLING CO., INC., Westfield, N.Y.
10

● **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
3—9

● **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
9

● **THE AMERICAN RUBBER MFG. CO.**, 1145 Park Avenue, Oakland 8, Calif.
4

ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge 41, Mass.
4

● **BACON-PIETSCH CO., INC.**, 149 Broadway, New York 6, N.Y.
4

● **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio
4—5

● **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
3—4—5—6

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
3—4—8—9—11

● **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.
4—5—6—9

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.
2—3—4—6—9—10—11

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
3—4—6—8

● **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
1—2—3—4—5—6—7
8—9—10—11

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.
4

BUILDERS-PROVIDENCE, INC., 345 Harris Avenue, Providence 1, R.I.
11

● **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
9

● **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
4—9

● **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.
4

CENTRAL MINE EQUIPMENT CO., 6200 N. Broadway, St. Louis 15, Mo.
9

● **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
3—4—6—8

● **COLORADO FUEL & IRON CORP.**, P.O. Box 1920, Denver 1, Colo.
3—4

● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
1—2—3—4—5—8

● **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.
3—4—6—8—9

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.
4—8—9

COYLE & ROTH, 3024 Fourth St. S.E., Minneapolis, Minn.
4—5

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.
2—9

● **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
3—4

● **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
4—5

● **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
9

● **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
3—4—6—7—8—9

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.
11

● **A. B. FARQUHAR CO.**, 142 N. Duke St., York, Pa.
4—5—6

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas
2—9

● **FULLER COMPANY**, Catasauqua, Pa.
2

● **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.
4

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.
3—4—5—6

● **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
4—5

● **GRUENDLER CRUSHER & PULV. CO.**, 2915 N. Market St., St. Louis 6, Mo.
3—4—8

● **GEO. HAISS MFG. CO., INC.**, Div. of Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.
4—5—6

● **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
2—9

● **E. LEE HEIDENREICH, JR.**, 75 Second St., Newburgh, N.Y.
4

● **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
4—9—10

● **HERCULES STEEL PROD. CORP.**, Sherman Street, Galion, Ohio
4

● **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
3—4—5—6—7—8—10—11

● **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
3—4—5

● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
3—4—6—8—9—10—11

● **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
4

● **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
2—3—4—5—6—8—9

● **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
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DIRECTORY

● **KOLMAN MFG. CO.**, West 12th St. Rd., Sioux Falls, S.D.
4—5

● **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.
4

● **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
1—3—4—6—7—8—9—10—11

● **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
3—4—5—6—8—9—10—11

● **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
4—6

MCNALLY PITTSBURG MFG. CORP., 307 W. 3rd Street, Pittsburg, Kansas
3—4—9—10

MAGIC CHEMICAL CO., 131 Crescent St., Brockton 2, Mass.
4

MAIN BELTING CO., 1241 Carpenter St., Philadelphia 47, Pa.
3—4—5

E. F. MARSH ENGR. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
3—4—5

● **MERRICK SCALE MFG. CO.**, 180 Autumn St., Passaic, N.J.
11

MILLER EQUIPMENT CO., INC., P.O. Box 1566, Salisbury, No. Car.
4

● **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
4—5

● **THE OLIVER CORP.**, 400 W. Madison St., Chicago 6, Ill.
4—5

● **PEKAY MACHINE & ENGR. CO.**, 100 N. LaSalle St., Chicago 2, Ill.
4

● **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
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● **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
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QUAKER RUBBER CORP., Div. of H. K. Porter Co., Inc., Tacony & Comly Streets, Philadelphia 24, Pa.
4

RED CAP CO., 15 Maple Ave., Paoli, Pa.
4

RICHARDSON SCALE CO., 668-698 Van Houten Ave., Clifton, N.J.
11

● **W. A. RIDDELL CORP.**, Bucyrus, Ohio
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WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.
3—4—5—6—7—8—9—10—11

ROBINSON CONVEYOR SYSTEMS, 205 E. 42nd St., New York 17, N.Y.
2

● **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
4—5

SANDVIK STEEL, INC., Steel Belt Conveyor Div., 111-8th Ave., New York 11, N.Y.
4

SCANDINAVIA BELTING CO., 250 Central Ave., Newark 1, N.J.
4

● **SIMPLICITY ENGINEERING CO.**, 213 S. Oak St., Durand, Mich.
8—10

● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
2—10

● **SMITH ENGINEERING WORKS**, 532 East Capitol Dr. Milwaukee 12, Wis.
4

SPROUT WALDRON & CO., INC., Muncy, Pa.
2—4—9

● **THE STANDARD METAL MFG. CO.**, Malinta, Ohio
3

● **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
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● **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
4—9

● **SYNTRON COMPANY**, 450 Lexington Ave., Homer City, Pa.
10

TRANSALL, INCORPORATED, 109 N. 11th St., Birmingham 4, Ala.
4

TROWBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N.J.
3—4—5—6—8

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4

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.
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4

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● **FULLER COMPANY**, Catasauqua, Pa.

● **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.

● **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

● **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio

● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

● **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.

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COUPLINGS, Pipe

JOHNS-MANVILLE, 22 E. 40th St., New York 16, New York

VICTAULIC COMPANY OF AMERICA, P.O. Box 509, Elizabeth, N.J.

WALWORTH COMPANY, 60 East 42nd St., New York 17, N.Y.

COUPLINGS, Shaft, Flexible Shaft (see Drives)

CRANE, Boom, Cable Stabilizer

FEDERAL MOTOR TRUCK DIV., Federal Fawick Corp., 5780 Federal Ave., Detroit 9, Mich.

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2. Electric
3. Gasoline

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1—2—3

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1—3

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1—2—3

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1—2

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1—3

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3

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● **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.
1

● **LINK-BELT SPEEDER CORP.**, 1201 Sixth St., S.W., Cedar Rapids, Iowa
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2

SILENT HOIST & CRANE CO., 895 63rd St., Brooklyn 20, N.Y.
1—2—3

SIX WHEELS, INC., 1584 E. 20th St., Los Angeles 54, Calif.
1—2—3

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  2
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• **THE HAYWARD CO.**, 202-204 Fulton St., New York, N.Y.

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• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.

• **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio

• **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

• **PIONEER RUBBER MILLS**, 353 Sacramento St., San Francisco, Calif.

QUAKER RUBBER CORP., Div. of H. K. Porter Co., Inc., Tacony & Comly Streets, Philadelphia 24, Pa.

• **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.

• **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.

DIESEL ENGINES, Automotive

• **THE BUDA COMPANY**, 154th & Commercial, Harvey, Illinois

CUMMINS ENGINE CO., INC., Fifth & Union, Columbus, Ind.

• **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.

• **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.

WAUKESHA MOTOR CO., W. St. Paul Ave., Waukesha, Wis.

DIESEL ENGINES, Stationary

1. **Less than 100 H.P.**
2. **100-500 HP.**
3. **500-1000 HP.**
4. **Over 1000 H.P.**

• **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.
4

• **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
1—2

• **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.
2—3—4

CONTINENTAL MOTORS CORP., 205 Market Street, Muskegon, Mich.
1—2

CUMMINS ENGINE CO., INC., Fifth & Union, Columbus, Ind.
1—2—3

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.
2—3—4

• **HARNISCHFEGER CORP.**, 4400 W. National Ave., Milwaukee 46, Wisc.
1—2

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.
2—3

• **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.
1—2

• **MINNEAPOLIS-MOLINE CO.**, P.O. Box 1050, Minneapolis 1, Minn.
1

• **MURPHY DIESEL CO.**, 5317 W. Burnham St., Milwaukee 14, Wisc.
1—2

NATIONAL SUPPLY, P.O. Box 416, Pittsburgh 30, Pa.
1—2—3—4

• **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
1—2—3—4

WAUKESHA MOTOR CO., W. St. Paul Ave., Waukesha, Wis.
1—2

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
2—3—4

DIPPER TEETH AND PARTS (see Bucket Lips & Teeth)

DIPPERS, Dredge & Shovel (see Buckets)

DRAFT GAUGES

• **BAILEY METER CO.**, 1050 Ivanhoe Road, Cleveland 10, Ohio

THE BRISTOL CO., Waterbury 20, Conn.

THE HAYS CORP., Michigan City, Ind.

DRAGLINE CABLEWAY EXCAVATORS

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

HYSTER COMPANY, 2918 N.E. Clackamas St., Portland 8, Ore.

STREET BROS. MACHINE CO., INC., 415 Dome Bldg., Chattanooga, Tenn.

DRAG LINES, Crawler

1. **Diesel**
2. **Electric**
3. **Gasoline**

• **AMERICAN HOIST & DERRICK CO.**, 63 S. Robert St., St. Paul 1, Minn.
1—2—3

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.
1—3

• **AUSTIN WESTERN CO.**, 601 N. Farnsworth Ave., Aurora, Ill.
1—2—3

• **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio
1—2—3

• **BAY CITY SHOVELS, INC.**, Bay City, Michigan
1—2—3

• **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.
1—2—3

• **GAR WOOD IND., INC.**, Findlay Division, Findlay, Ohio
1—2

THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio
1—3

• **HARNISCHFEGER CORP.**, 4400 W. National Ave., Milwaukee 46, Wisc.
1—2

HYSTER COMPANY, 2918 N.E. Clackamas St., Portland 8, Ore.
3

• **INSLEY MFG. CORP.**, 801 N. Olney St., Indianapolis 6, Ind.
1—2—3

• **KOEHRING COMPANY**, 3026 W. Concordia Ave., Milwaukee 16, Wisc.
1—2—3

• **LINK-BELT SPEEDER CORP.**, 1201 Sixth St., S.W., Cedar Rapids, Iowa
1—2—3

• **MANITOWOC ENGR. CORP.**, So. 16th St., Manitowoc, Wisc.
1—3

• **MARION POWER SHOVEL CO.**, 617 W. Center St., Marion, Ohio
1—2—3

MICHIGAN POWER SHOVEL CO., Miller Street, Benton Harbor, Mich.
1—3

• **NORTHWEST ENGINEERING CO.**, 135 S. LaSalle St., Chicago 3, Ill.
1—2—3

• **OSGOOD-GENERAL**, 1205 Cheney Ave., Marion, Ohio
1—2—3

PAGE ENGR. CO., Clearing Post Office, Chicago 38, Ill.
1—2—4

• **THE THEW SHOVEL CO.**, E. 28th St. & Fulton Rd., Lorain, Ohio
1—2—3

• **UNIT CRANE & SHOVEL CORP.**, 6411 W. Burnham St., Milwaukee 14, Wisc.
1—2—3

DRAGLINES, Truck Mounted

• **AMERICAN HOIST & DERRICK CO.**, 63 S. Robert St., St. Paul 1, Minn.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

• **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio

• **BAY CITY SHOVELS, INC.**, Bay City, Michigan

• **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.

• **GAR WOOD IND., INC.**, Findlay Division, Findlay, Ohio

THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio

• **HARNISCHFEGER CORP.**, 4400 W. National Ave., Milwaukee 46, Wisc.

• **INSLEY MFG. CORP.**, 801 N. Olney St., Indianapolis 6, Ind.

• **KOEHRING COMPANY**, 3026 W. Concordia Ave., Milwaukee 16, Wis.

• **LINK-BELT SPEEDER CORP.**, 1201 Sixth St., S.W., Cedar Rapids, Iowa

MICHIGAN POWER SHOVEL CO., Miller Street, Benton Harbor, Mich.

• **NORTHWEST ENGINEERING CO.**, 135 S. LaSalle St., Chicago 3, Ill.

• **OSGOOD-GENERAL**, 1205 Cheney Ave., Marion, Ohio

• **"QUICK-WAY" TRUCK SHOVEL CO.**, 2400 E. 40th Ave., Denver 5, Colo.

• **SCHIELD BANTAM CO.**, 216 Park St., Waverly, Iowa

• **THE THEW SHOVEL CO.**, E. 28th St. & Fulton Rd., Lorain, Ohio

DRAGLINES, Walking

1. **Diesel**
2. **Electric**
3. **Gasoline**
4. **Electric Generator**

• **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.
1—2—3—4

GODREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.
2—3

• **MARION POWER SHOVEL CO.**, 617 W. Center St., Marion, Ohio
1—2

DRAGS, Sand (see Sand Recovery Machinery)

DREDGE HOISTS

• **AMERICAN HOIST & DERRICK CO.**, 63 S. Robert St., St. Paul 1, Minn.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

CLYDE IRON WORKS, INC., Duluth 1, Minn.

STREET BROS. MACHINE CO., INC., 415 Dome Bldg., Chattanooga, Tenn.

SUPERIOR-LIDGERWOOD-MUNDY CORP., 1101 John Ave., Superior, Wis.

DREDGE PIPE AND FITTINGS

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

• A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

• **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.

• **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.

DREDGE PIPE SLEEVES

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

• **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.

• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

• **GOODALL RUBBER CO.**, 403 Whitehead Road, Trenton 4, N.J.

• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio

• **HETHERINGTIN & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.

• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.

• **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

• **PIONEER RUBBER MILLS**, 353 Sacramento St., San Francisco 11, Calif.

QUAKER RUBBER CORP., Div. of H. K. Porter Co., Inc., Tacony & Comly Streets, Philadelphia 24, Pa.

• **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.

DREDGE PUMPS (see Pumps, Dredge)

DREDGES, Sand & Gravel

1. Bucket
2. Ladder
3. Pump

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.
2—3

• **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.
1—2—3

• **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
2

• **GEORGIA IRON WORKS CO.**, 605 12th St., Augusta, Ga.
2—3

• **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
3

• **MORRIS MACHINE WORKS**, 20 E. Genesee St., Baldwinsville, N.Y.
3

• **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.
1—2

DRIFTERS

• **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.

• **GARDNER-DENVER CO.**, Quincy, Ill.

• **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **LEROI COMPANY**, 1706 S. 68th St., Milwaukee 14, Wisc.

DRILL BITS (see Bits)

DRILL STEEL

BETHLEHEM STEEL CO., Third Street, Bethlehem, Pa.

BRUNNER & LAY, INC., 9300 King Street, Franklin Park, Ill.

HARDSOCG PNEUMATIC TOOL CO., 225 So. Benton, Ottumwa, Iowa

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

DRILLING ACCESSORIES

CENTRAL MINE EQUIPMENT CO., 6200 N. Broadway, St. Louis 15, Mo.

HARDSOCK PNEUMATIC TOOL CO., 225 So. Benton, Ottumwa, Iowa

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

THE LOOMIS MACHINE CO., 1500 E. Market St., Tiffin, Ohio

THE SALEM TOOL CO., Box 235, Salem, Ohio

• **SPRAGUE & HENWOOD, INC.**, 221 W. Olive St., Scranton 2, Pa.

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

DRILLING CABLE, Manila, Sisal, etc.

THE LOOMIS MACHINE CO., 1500 E. Market St., Tiffin, Ohio

• **MACWHYTE CO.**, 2949 14th Ave., Kenosha, Wisc.

DRILLS, Core

ACKER DRILL CO., INC., 721 W. Lackawanna Ave., Scranton 3, Pa.

• **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

MOBILE DRILLING, INC., 960 N. Pennsylvania St., Indianapolis, Ind.

• **SPRAGUE & HENWOOD, INC.**, 221 W. Olive St., Scranton 2, Pa.

DRILLS, Rock

1. Electric
2. Gasoline
3. Pneumatic
4. Jet Piercing

ACKER DRILL CO., INC., 721 W. Lackawanna Ave., Scranton 3, Pa.
2

BARCO MFG. CO., 1801 W. Winnemac Ave., Chicago 40, Ill.
2

• **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.
1—2

• **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.
3

• **GARDNER-DENVER CO.**, Quincy, Ill.
3

HARDSOCK PNEUMATIC TOOL CO., 225 So. Benton, Ottumwa, Iowa
3

HOSSFELD MFG. CO., 460-62 W. Third St., Winona, Minn.
1—2—3

• **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.
3

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.
3

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
3

• **LEROI COMPANY**, 1706 S. 68th St., Milwaukee 14, Wisc.
3

LINDE AIR PRODUCTS CO., Div. of Union Carbide & Carbon Corp., 30 East 42nd Street, New York 17, N.Y.
4

MCCULLOCH MOTORS CORP., 6101 W. Century Blvd., Los Angeles 45, Calif.
2

MOBILE DRILLING, INC., 960 N. Pennsylvania St., Indianapolis, Ind.
2

THE SALEM TOOL CO., Box 235, Salem, Ohio
1—2

• **SYNTRON COMPANY**, 450 Lexington Ave., Homer City, Pa.
2

WARSOP POWER TOOLS, INC., P.O. Box 1809, Wilmington 99, Del.
2

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
3

DRILLS, Stoper

• **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.

ELLIOTT COMPANY, Jeannette, Pa.

• **GARDNER-DENVER CO.**, Quincy, Ill.

• **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **LEROI COMPANY**, 1706 S. 68th St., Milwaukee 14, Wisc.

DRILLS, Well or Blast-Hole

• **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.

CENTRAL MINE EQUPMEINT CO., 6200 N. Broadway, St. Louis 15, Mo.

• **GARDNER-DENVER CO.**, Quincy, Ill.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **THE LOOMIS MACHINE CO.**, 1500 E. Market St., Tiffin, Ohio

MCCULLOCH MOTORS CORP., 6101 W. Century Blvd., Los Angeles 45, Calif.

MOBILE DRILLING, INC., 960 N. Pennsylvania St., Indianapolis, Ind.

SANDERSON CYCLONE DRILL CO., 157 S. Main St., Orrville, Ohio

DRIVES

1. Chain
2. Flat Belt
3. Flexible Shaft
4. Gear
5. Short Center
6. Variable Speed
7. V-Belt

ABART GEAR & MACHINE CO., 4832 W. 16th St., Chicago 50, Illinois
4—6

AJAX FLEXIBLE COUPLING CO., INC., Westfield, N.Y.
3

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
5—6—7

• **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
4—5

• **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
1

COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif.
1—4

• **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.
3—7

DIAMOND CHAIN CO., INC., 402 Kentucky Ave., Indianapolis 7, Ind.
1—3—5

• **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
1—2—4—7

• **DODGE MFG. CORP.**, Mishawaka, Ind.
1—2—3—4—5—6—7

DURKEE-ATWOOD CO., 215 N.E. 7th St., Minneapolis 13, Minn.
2—3

• **DYNAMATIC CORP.**, 3307 14th Ave., Kenosha, Wis.
6

• **THE EARL GEAR & MACHINE CO.**, 4707 Stenton Ave., Philadelphia 44, Pa.
4

• **ELECTRIC MACHINERY MFG. CO.**, 800 Central Avenue, Minneapolis 13, Minn.
5

ELLIOTT COMPANY, Jeannette, Pa.
3

• **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
1—2—4—5—7

THE FALK CORP., 3001 W. Canal St., Milwaukee 8, Wisc.
3—4

FARREL-BIRMINGHAM CO., INC., Ansonia, Conn.
4

FOOTE BROS. GEAR & MACHINE CORP., 4545 Western Blvd., Chicago 9, Illinois
4

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas
1—7

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.
6

• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
2—7

• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
1—2—3—4—6

IMPERIAL CONST. EQUIPMENT, 3400 Lake Street, Melrose Park, Ill.
4

• **IOWA MFG. CO.**, 916-16th St., N.E., Cedar Rapids, Iowa
4

D. O. JAMES GEAR MFG. CO., 1140 W. Monroe St., Chicago 7, Ill.
3—4

• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
1

• **W. A. JONES FOUNDRY & MACHINE CO.**, 4401 W. Roosevelt Road, Chicago 24, Ill.
2—4—7

KOPPERS COMPANY, INC., Koppers Bldg., Grant St., & 7th Ave., Pittsburgh 19, Pa.
3

• **THE LIMA ELECTRIC MOTOR CO.**, 4300 Findlay Road, Lima, Ohio
4—6

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
1—3—4—5—6—7

LOVEJOY FLEXIBLE COUPLING CO., 5037 W. Lake Street, Chicago 44, Ill.
2—3—5—6—7

MORSE CHAIN CO., 7601 Central Ave., Detroit 8, Mich.
1—5

PHILADELPHIA GEAR WORKS, INC., "G" St. below Erie Ave., Philadelphia 34, Pa.
3—4

REEVES PULLEY CO., 100 N. Wilson St., Columbus, Ind.
6

RELIANCE ELECTRIC & ENGR. CO., 1058 Ivanhoe Road, Cleveland 10, Ohio
5

STANDARD PRESSED STEEL CO., Jenkintown, Pa.
3

• **STERLING ELECTRIC MOTORS, INC.**, 5401 Anaheim-Telegraph Rd., Los Angeles 22, Calif.
5

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
4—6

• A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

TRANSMISSION & GEAR CO., 10421 Haggerty Ave., Dearborn, Mich.
4—6

THE TRUCKSTOR CORPORATION, Route No. 29, Mountainside, N.J.
1

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.
1—4—7

U.S. ELECTRICAL MOTORS, INC., 200 E. Slauson Ave., Los Angeles 54, Calif.
4—6

VICKERS INCORPORATED, 1400 Oakman Blvd., Detroit 32, Mich.
6

JOHN WALDRON CORP., P.O. Box 791, New Brunswick, N.J.
3

WHITNEY CHAIN CO., 237 Hamilton St., Hartford 6, Conn.
1

- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
4—6—7

DROP BALLS

- **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.

DRY PANS

- **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
- **W. A. RIDDELL CORP.**, Bucyrus, Ohio

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

DRYERS, Rotary, Gravel, Rock, Sand

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- **THE EIMCO CORP.**, P.O. Box 300 Salt Lake City 10, Utah
- **GENERAL AMERICAN TRANSPT. CORP.**, 139 So. 4th St., Louisville 2, Ky.
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
- **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
- **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
- **ROGERS IRON WORKS CO.**, 11th &Pearl Sts., Joplin, Mo.
- **SHORE ENGINEERING CO.**, 320-322 Broadway, New York 7, N.Y.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

STANDARD STEEL CORP., 5036 Boyle Ave., Los Angeles 58, Calif.

- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

DRYERS, Plaster Board

- **THE COE MFG. CO.**, Bank St., Painesville, Ohio
- **SHORE ENGINEERING CO.**, 320-322 Broadway, New York 7, N.Y.

DRYERS, Steam Coil

- **GENERAL AMERICAN TRANSPT. CORP.**, 139 So. 4th St., Louisville 2, Ky.
- **SHORE ENGINEERING CO.**, 320-322 Broadway, New York 7, N.Y.

DUMPING MECHANISMS, Truck

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.

- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.

THE GALION ALLSTEEL BODY CO., 605 S. Market Street, Galion, Ohio

THE MARION METAL PROD. CO., Cheney Avenue, Marion, Ohio

TRUCK ENGINERING CORP., 1285 W. 70th St., Cleveland 2, Ohio

DUST COLLECTING EQUIPMENT ACCESSORIES

AMERICAN BLOWER CORP., Detroit 32, Mich.

AMERICAN VENTILATING HOSE CO., Div. Callahan Zinc-Lead Co., Inc., 100 Park Ave., New York 17, N.Y.

AMERICAN WHEELABRATOR & EQUIP. CORP., 1281 S. Byrkit St., Mishawaka, Ind.

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.

- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio
- **SINTERING MACHINERY CORP.**, Box 68, Netcong, N.J.
- **THE W. W. SLY MFG. CO.**, 4746 Train Ave., Cleveland 2, Ohio

DUST COLLECTORS

1. Bag Type
2. Cyclone
3. Electric Precipitators
4. Hydraulic
5. Portable

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
1

AMERICAN AIR FILTER CO., INC., 215 Central Ave., Louisville 8, Ky.
4—5

AMERICAN BLOWER CORP., Box 58, Detroit 32, Mich.
2

AMERICAN WHEELABRATOR & EQUIP. CORP., 1281 S. Byrkit St., Mishawaka, Ind.
1

- **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
2—5

BY-PRODUCTS RECOVERIES, INC., 90 West St., New York 6, N.Y.
2

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.
3—4

- **THE FLY ASH ARRESTOR CORP.**, 203 North First St., Birmingham, Ala.
2

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas
2

- **GENERAL AMERICAN TRANSPT. CORP.**, 139 So. 4th St., Louisville 2, Ky.
2
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
2
- **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
2
- **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
2
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
2—5

THE JOHNSON-MARCH CORP., 1724 Chestnut St., Philadelphia 3, Pa.
4

KOPPERS COMPANY, INC., Koppers Bldg., Grant St. & 7th Ave., Pittsburgh 19, Pa.
3

THE NORTHERN BLOWER CO., 6409 Barberton Ave., Cleveland 11, Ohio
1—2—4—5

PANGBORN CORP., 120 Pangborn Bldv., Hagerstown, Md.
1—5

- **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
5
- **PULVERIZING MACHINERY CO.**, Chatham Road, Summit, N.J.
1
- **RESEARCH CORP.**, Bound Brook, N.J.
3
- **SINTERING MACHINERY CORP.**, Box 68, Netcong, N.J.
1—2
- **THE W. W. SLY MFG. CO.**, 4746 Train Ave., Cleveland 2, Ohio
1
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
1

SPROUT WALDRON & CO., INC., Muncy, Pa.
2

UNITED STATES HOFFMAN MACHRY CORP., 105 Fourth Ave., New York 3, N.Y.
2

- **WESTERN PRECIPITATION CORP.**, 1016 W. Ninth St., Los Angeles 15, Calif.
1—2—3

WHITING CORPORATION, 157th & Lathrop, Harvey, Ill.
1

- **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.
1—2

DUST COLLECTORS, Rock Drill

AMERICAN AIR FILTER CO., INC., 215 Central Ave., Louisville 8, Ky.

JAMES H. MARKLEY, 80 Snyder Road, Ramsey, N.J.

MINE SAFETY APPLIANCES CO., 230 N. Braddock Ave., Pittsburgh 8, Pa.

- **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio

DUST SAMPLING AND ANALYZING EQUIPMENT

MINE SAFETY APPLIANCES CO., 230 N. Braddock Ave., Pittsburgh 8, Pa.

DYNAMITE AND BLASTING EXPLOSIVES (see Explosives and Dynamite)

E

EARTH MOVING HAULAGE EQUIPMENT, Self Loading

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.

- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
- **THE EUCLID ROAD MACHINERY CO.**, 1361 Chardon Road, Cleveland 17, Ohio
- **GAR WOOD IND., INC.**, Findlay Division, Findlay, Ohio
- **THE HEIL COMPANY**, 3000 W. Montana St., Milwaukee 1, Wisc.

HENNEUSE ENG. CO., Marion, Ohio

- **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.

ISACCSON IRON WORKS, 2917 E. Marginal Way, Seattle 14, Wash.

- **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.
- **LULL MFG. CO.**, 134 W. 90th St., Minneapolis 20, Minn.

PULLMAN-STANDARD CAR MFG. CO., 79 E. Adams Street, Chicago 3, Ill.

WOODDRIDGE MFG. CO., Hendy Ave., Sunnyvale, Calif.

ECONOMIZERS, Waste Heat (see Boilers, Waste Heat)

ELECTRIC MOTORS

THE LOUIS ALLIS CO., 427 E. Stewart St., Milwaukee 7, Wis.

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

CENTURY ELECTRIC CO., 1806 Pine Street, St. Louis 3, Mo.

- **ELECTRIC MACHINERY MFG. CO.**, 800 Central Avenue, Minneapolis 13, Minn.

ELLIOTT COMPANY, Jeannette, Pa.

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.
- **R. G. LETOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.
- **THE LIMA ELECTRIC MOTOR CO.**, 4300 Findlay Road, Lima, Ohio

RELIANCE ELECTRIC & ENGR. CO., 1058 Ivanohe Road, Cleveland 10, Ohio

- **STERLING ELECTRIC MOTORS, INC.**, 5401 Anaheim-Telegraph Rd., Los Angeles 22, Calif.

U.S. ELECTRICAL MOTORS, INC., 200 E. Slauson Ave., Los Angeles 54, Calif.

ELECTRIC SWITCH GEAR

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **ELECTRIC MACHINERY MFG. CO.**, 800 Central Avenue, Minneapolis 13, Minn.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

ELECTRIC TRANSFORMERS

- **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.
- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

ELECTRIC EQUIPMENT AND SUPPLIES

- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

ELECTRODES, WELDING (see Welding Rods and Electrodes)

ELEVATORS, Chain or Belt & Bucket

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **THE AMERICAN RUBBER MFG. CO.**, 1145 Park Avenue, Oakland 8, Calif.

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge 41, Mass.

- **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.

- **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.

- **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
- **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
- **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
- **FLEMING MFG. CO.**, 105 Fleming Ave., Cuba, Missouri

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.

- **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
- **GRUENDLER CRUSHER & PULV. CO.**, 2915 N. Market St., St. Louis 6, Mo.
- **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
- **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
- **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.

MCNALLY PITTSBURG MFG. CORP., 307 W. 3rd Street, Pittsburg, Kansas

- **PEKAY MACHINE & ENGR. CO.**, 100 N. LaSalle St., Chicago 2, Ill.
- **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
- **PRASCHAK MACHINE CO.**, Hwy. 13, South, Marshfield, Wisc.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
- **SMITH ENGINEERING WORKS**, 532 East Capitol Dr., Milwaukee 12, Wis.

SPROUT WALDRON & CO., INC., Muncy, Pa.

STEDMAN FOUNDRY & MACHINE CO., INC., 507 Indiana Ave., Aurora, Ind.

- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

- **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa
- **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N.Y.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.
- **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.

ELEVATORS, Bulk Cement

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge 41, Mass.

- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
- **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

- **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
- **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
- **GRUENDLER CRUSHER & PULV. CO.**, 2915 N. Market St., St. Louis 6, Mo.
- **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
- **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

ELEVATORS, Portable (see Loaders, Truck)

ENGINEERING SERVICE, Consulting and Designing

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

CONSTRUCTION PROD. SALES, 4043 Goodwin Avenue, Los Angeles 39, Calif.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

- **THE DORR CO. ENGRS.**, Barry Place, Stamford, Conn.
- **HAMMERMILLS, INC.**, Div. Pettibone Mulliken Corp., 4700 W. Division St., Chicago 51, Ill.
- **E. LEE HEIDENREICH, JR.**, 75 Second St., Newburgh, N.Y.
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **ISAACSON IRON WORKS**, 2917 E. Marginal Way, Seattle 14, Wash.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

MCNALLY PITTSBURG MFG. CORP., 307 W. 3rd Street, Pittsburg, Kansas

- **MACDONALD ENGR. CO.**, 188 W. Randolph St., Chicago 1, Ill.
- **M & M ENGR. CORP.**, 1017 W. 23rd St., Indianapolis 23, Ind.

MILLER EQUIPMENT CO., INC., P.O. Box 1566, Salisbury, No. Car.

THE NICHOLSON CO., INC., 10 Rockefeller Plaza, New York 20, N.Y.

R. C. REID—ENGINEERS, 11 W. 42nd St., New York 36, N.Y.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
- **SEPARATION PROCESS CO.**, Fuller Building, Catasauqua, Pa.
- **SHORE ENGINEERING CO.**, 320-322 Broadway, New York 7, N.Y.

THE SINK & FLOAT DIV., C. Tennant, Sons & Co., of N.Y., 100 Park Ave., New York 17, N.Y.

- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **SMITH ENGINEERING WORKS**, 532 East Capitol Dr., Milwaukee 12, Wis.

THE VIBRATION ENGINEERING CO., 131 No. Wyoming St., Hazleton, Pa.

- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.
- **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.
- **J. C. WITT**, 5834 Stony Island Ave., Chicago 37, Ill.

ENGINES, Diesel (see Diesel Engines)

ENGINES

1. Gasoline
2. Kerosene
3. Marine
4. Natural Gas or L. P. G.

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc. 1—2—3—4
- **THE BUDA COMPANY**, 154th & Commercial, Harvey, Illinois 1—2—3—4

J. I. CASE COMPANY, 700 State Street, Racine, Wisconsin 1—2

- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill. 3
- **MARINE & INDUSTRIAL ENGINE DIV. OF CHRYSLER CORPORATION**, 2000 Van Horn Road—P.O. Drawer W, Trenton, Michigan 3—4

CONTINENTAL MOTORS CORP., 205 Market Street, Muskegon, Mich. 1—2—3—4

CUMMINS ENGINE CO., INC., Fifth & Union, Columbus, Ind. 3—4

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill. 1—2—3—4

- **FORD DIV., FORD MOTOR CO.**, P.O. Box 658, Dearborn, Mich. 1
- **FORD MOTOR CO.**, Industrial Eng. Dept., 15050 Woodward Ave., Highland Pk. 3, Mich. 1

HOMELITE CORP., Riverdale Ave., Port Chester, N.Y. 1

- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill. 1—4
- **LEROI COMPANY**, 1706 S. 68th St., Milwaukee 14, Wisc. 1—2

MCCULLOCH MOTORS CORP., 6101 W. Century Blvd., Los Angeles 45, Calif. 1

- **MINNEAPOLIS-MOLINE CO.**, P.O. Box 1050, Minneapolis 1, Minn. 1—2—3—4
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc. 3—4
- **THE OLIVER CORP.**, 400 W. Madison St., Chicago 6, Ill. 1—2—4

D. W. ONAN & SONS, INC., University Ave. S.E., at 25th, Minneapolis 14, Minn. 1—2—4

REO MOTORS, INC., 1331 S. Washington Ave., Lansing 20, Mich. 1—4

WAUKESHA MOTOR CO., W. St. Paul Ave., Waukesha, Wis. 1—2—3—4

WISCONSIN MOTOR CORP., 1910 So. 53rd St., Milwaukee 46, Wis. 1—2—4

- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J. 3—4

ENTRAINED AIR INDICATORS

AMERICAN INSTRUMENT CO., Silver Spring, Md.

CENTRAL SCIENTIFIC CO., 1700 Irving Park Road, Chicago 13, Ill.

- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

CHARLES R. WATTS & CO., 4121 Sixth Ave. N.W., Seattle 7, Wash.

EXCAVATORS, Cableway Dragline (see Cable Excavators)

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

EXCAVATORS, Clamshell (see Cranes)

EXCAVATORS, Scraper (see Cable Excavators)

EXCAVATORS, Tower (see Cableways)

EXHAUSTERS

AMERICAN BLOWER CORP., Detroit 32, Mich.

C. L. AMMERMAN CO., 104 No. 2nd St., Minneapolis 1, Minn.

BUFFALO FORGE CO., 490 Broadway, Buffalo 4, N.Y.

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.

• **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio

UNITED STATES HOFFMAN MACHRY CORP., 105 Fourth Ave., New York 3, N.Y.

• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

EXPLOSIVES AND DYNAMITE

• **AMERICAN CYANAMID CO.**, 30 Rockefeller Plaza, New York 20, N.Y.

• **ATLAS POWDER CO.**, Wilmington 99, Del.

• **E. I. DU PONT DE NEMOURS & CO., INC.**, Nemours Building, Wilmington 98, Del.

• **HERCULES POWDER CO.**, 946 King Street, Wilmington 99, Dela.

NATIONAL POWDER CO., Eldred, McKean County, Pa.

SHAPED CHARGE EXPLOSIVE MFGS. INC., P.O. Box 900, Martinsburg, W. Va.

TROJAN POWDER CO., 17–N. 7th St., Allentown, Pa.

F

FANS AND BLOWERS

AMERICAN BLOWER CORP., Detroit 32, Mich.

C. L. AMMERMAN CO., 104 No. 2nd Street, Minneapolis 1, Minn.

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.

BUFFALO FORGE CO., 490 Broadway, Buffalo 4, N.Y.

CLARAGE FAN COMPANY, Kalamazoo 16, Mich.

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.

• **THE FLY ASH ARRESTOR CORP.**, 203 North First St., Birmingham, Ala.

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas

HOMELITE CORP., Riverdale Ave., Port Chester, N.Y.

• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio

JOHNSTON MFG. CO., 2825 E. Hennepin Ave., Minneapolis 13, Minn.

• **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

KOPPERS COMPANY, INC., Koppers Bldg., Grant St. & 7th Ave., Pttsburgh 19, Pa.

• **THE NORTHERN BLOWER CO.**, 6409 Barberton Ave., Cleveland 11, Ohio

PRAT-DANIEL CORP., 2 Meadow St., So. Norwalk, Conn.

• **SHORE ENGINEERING CO.**, 320-322 Broadway, New York 7, N.Y.

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

THE SPENCER TURBINE CO., 486 New Park Ave., Hartford 6, Conn.

• **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.

FASTENERS, Belt (see Belt Fasteners)

FEEDERS, Concrete

• **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio

FEEDERS, Flue Dust

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

FEEDERS

1. **Apron**
2. **Proportioning**
3. **Reciprocating**
4. **Screw**
5. **Table**
6. **Weight Proportioning**
7. **Rotary**
8. **Chain**
9. **Scale Conveyor**
10. **Vibrating**

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
1—2—3—4—7

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave, New York 17, N.Y.
1

• **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
4

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2—3

• **BACON-PIETSCH CO., INC.**, 149 Broadway, New York 6, N.Y.
1

• **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio
1—3

• **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
1—3

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio
1—3—4—5—7

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.
1—3—4—7—8—9

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
1—3

• **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
1—2—3—6—9

BUILDERS-PROVIDENCE, INC., 345 Harris Avenue, Providence 1, R.I.
9

• **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
4—7

• **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
4

• **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
1—3—5—8

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
4

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.
1—3—4

• **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.
1—3—4—8

THE DAY COMPANY, 810 Third Ave. N.E., Minneapolis 13, Minn.
4

• **THE DEISTER CONCENTRATOR CO.**, 901 Glasgow Ave., Fort Wayne 1, Ind.
2

• **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
1—4—7

• **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
1—3

• **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
1—2—3—4

• **FULLER COMPANY**, Catasauqua, Pa.
7

• **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah
3

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.
1

• **HAMMERMILLS, INC.**, Div. of Pettinbone Mulliken Corp., 4700 W. Division St., Chicago 51, Ill.
1—2—3

• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
6—7

• **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
4

• **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
3

• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
1—2—3—5—7

• **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
1—3

• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
1—2—3—4—6

• **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
1—2—3—4—5—6

• **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
1—2—3—4

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
1—2—3—4—5—6—7—8—9

• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
1—4

• **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
1—3

• **MCNALLY PITTSBURG MFG. CORP.**, 307 W. 3rd Street, Pittsburg, Kansas
1

E. F. MARSH ENGR. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.
1—3

• **MERRICK SCALE MFG. CO.**, 180 Autumn St., Passaic, N.J.
6—9

MILLER EQUIPMENT CO., INC., P.O. Box 1566, Salisbury, No. Car.
3

• **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
1

OMEGA MACHINE CO., 345 Harris Ave., Providence 1, R.I.
2—6—9

• **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
1

• **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
1—2—3

RICHARDSON SCALE CO., 668-698 Van Houten Ave., Clifton, N.J.
2—6—9

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.
1—2—3—4—5—6—7—8—9

• **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
1—3—7

• **ROSS SCREEN & FEEDER CO.**, 19 Rector St., New York 6, N.Y.
8

SCHAFFER POIDOMETER CO., 2828 Smallman St., Pittsburgh 22, Pa.
6

• **SINTERING MACHINERY CORP.**, Box 68, Netcong, N.J.
2—3—4—5—6—7—9

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
1—2—3—4—5—7

• **SMITH ENGINEERING WORKS**, 532 East Capitol Dr., Milwaukee 12, Wis.
1—3

SPROUT WALDRON & CO., INC., Muncy, Pa.
7

J. C. STEELE & SONS, INC., P.O. Box 951, Statesville, N.C.
2—4

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
1—2—3—4—7—8

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
3—4

• **SYNTRON COMPANY**, 450 Lexington Ave., Homer City, Pa.
2—3—6—10

• **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
1—5

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.
1—3—4—7—8

• **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa
1

• **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N.Y.
1

• **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.
1—3—4—7

FIFTH WHEEL, Heavy Duty, Special

• **AMERICAN STEEL FOUNDRIES**, 400-410 N. Michigan Ave., Chicago 11, Ill.

FILTER CLOTH, Slurry Filter

• **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah

• **SINTERING MACHINERY CORP.**, Box 68, Netcong, N.J.

• **THE W. S. TYLER CO.**, 3615 Superior Ave., Cleveland 14, Ohio

FILTERS, Cement Slurry (see Slurry Filters)

FIRE BRICK, Kiln Liners, etc. (see Refractories)

FLEXIBLE COUPLINGS (see Drives)

FLOORING, Industrial, Iron and Steel

• **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.

• **HENDRICK MFG. CO.**, Dundaff Street, Carbondale, Pa.

SAKRETE INC., P.O. Box 11, Cincinnati 17, Ohio

• **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.

• **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

• A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

FLOORING SYSTEMS, Concrete (see Concrete Specialty Forms)

FLOTATION EQUIPMENT

- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah
- **GENERAL AMERICAN TRANSPORTATION CORP.**, 135 So. LaSalle St., Chicago 90, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- **SEPARATION PROCESS CO.**, Fuller Building, Catasauqua, Pa.

THE SINK & FLOAT DIV., C. Tennant, Sons & Co., of N.Y., 100 Park Ave., New York 17, N.Y.

- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.

FLOTATION REAGENTS & SUPPLIES

ARMOUR & COMPANY, 1355 W. 31st St., Chicago 9, Ill.

- **DIAMOND IRON WORKS, INC.**, 1728 2nd St., Minneapolis 11, Minn.

THE DOW CHEMICAL CO., Midland, Mich.

- **HERCULES POWDER CO.**, 946 King St., Wilmington, Del.

PHILADELPHIA QUARTZ CO., 1146 Public Ledger Bldg., Philadelphia 6, Pa.

- **SEPARATION PROCESS CO.**, Fuller Building, Catasauqua, Pa.

FROGS AND SWITCHES, Railway

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

BETHLEHEM STEEL CO., Third Street, Bethlehem, Pa.

THE C. S. CARD IRON WKS. CO., P. O. Box 117, Denver 1, Colo.

- **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
- **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.

- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.

FURNACES, Forging

AIR DEVICES INC., 17 E. 42nd St., New York 17, N.Y.

- **DIAMOND IRON WORKS INC.**, 1728 North 2nd St., Minneapolis 11, Minn.

JOHNSTON MFG. CO., 2825 E. Hennepin Ave., Minneapolis 13, Minn.

FUSES, Detonating and Blasting (see Blasting Supplies)

G

GAS ANALYZERS AND RECORDERS

- **BAILEY METER CO.**, 1050 Ivanhoe Road, Cleveland 10, Ohio

ARNOLD O. BECKMAN, INC., 1020 Mission St., South Pasadena, Calif.

- **CAMBRIDGE INSTRUMENT CO., INC.**, Grand Central Terminal, New York 17, N.Y.

THE HAYS CORP., Michigan City, Ind.

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.

MINE SAFETY APPLIANCES CO., 230 N. Braddock Ave., Pittsburgh 8, Pa.

GAS BURNERS, Natural

CLEAVER-BROOKS CO., 326 E. Keefe Ave., Milwaukee 12, Wisc.

(COMBUSTION EQUIPMENT DIV.) Todd Shipyards Corp., 81-16—45th Ave., Elmhurst, Queens, N.Y.

HAUCK MFG. CO., 137-147 Tenth St., Brooklyn 15, N.Y.

- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.

GAS PRODUCERS

THE SIGHT FEED GENERATOR CO., P.O. Box 38, West Alexandria, Ohio

- **WELLMAN ENGINEERING CO.**, 7000 Central Ave., Cleveland 4, Ohio

GATES (see Bin Gates and Chutes)

GEAR-MOTORS

ABART GEAR & MACHINE CO., 4832 W. 16th St., Chicago 50, Ill.

THE LOUIS ALLIS CO., 427 E. Stewart St., Milwaukee 7, Wis.

- **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

THE FALK CORP., 3001 W. Canal St., Milwaukee 8, Wisc.

FOOTE BROS. GEAR & MACHINE CORP., 4545 Western Blvd., Chicago 9, Illinois

- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

D. O. JAMES GEAR MFG. CO., 1140 W. Monroe St., Chicago 7, Illinois

- **THE LIMA ELECTRIC MOTOR CO.**, 4300 Findlay Road, Lima, Ohio
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

PHILADELPHIA GEAR WORKS, INC., "G" St. below Erie Ave., Philadelphia 34, Pa.

RELIANCE ELECTRIC & ENGR. CO., 1058 Ivanhoe Road, Cleveland 10, Ohio

- **STERLING ELECTRIC MOTORS, INC.**, 5401 Anaheim-Telegraph Rd., Los Angeles 22, Calif.
- **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.

GEAR REDUCERS (see Drives)

GEARS

ABART GEAR & MACHINE CO., 4832 W. 16th St., Chicago 50, Ill.

- **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.
- **DODGE MFG. CORP.**, Mishawaka, Ind.

THE FALK CORP., 3001 W. Canal St., Milwaukee 8, Wisc.

- **FARREL-BIRMINGHAM CO., INC.**, Ansonia, Conn.

FOOTE BROS. GEAR & MACHINE CORP., 4545 Western Blvd., Chicago 9, Illinois

- **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

D. O. JAMES GEAR MFG. CO., 1140 W. Monroe St., Chicago 7, Ill.

- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **W. A. JONES FOUNDRY & MACHINE CO.**, 4401 W. Roosevelt Road, Chicago 24, Ill.
- **THE LIMA ELECTRIC MOTOR CO.**, 4300 Findlay Road, Lima, Ohio
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

LOVEJOY FLEXIBLE COUPLING CO., 5037 W. Lake Street, Chicago 44, Ill.

PHILADELPHIA GEAR WORKS, INC., "G" St. below Erie Ave., Philadelphia 34, Pa.

REEVES PULLEY CO., 100 N. Wilson St., Columbus, Ind.

- **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
- **STROH PROCESS STEEL CO.**, 1428 High St. N.S., Pittsburgh 12, Pa.

THE TOOL STEEL GEAR & PINION CO., 211 Township Ave., Cincinnati 16, Ohio

- **TORCON CORPORATION**, 493 E. 5th St., Ashtabula, Ohio
- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

GENERATOR SETS, Electric

1. Diesel Engine
2. Gasoline Engine
3. Electric Motor
4. Turbine

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc. 3—4
- **THE BUDA COMPANY**, 154th & Commercial, Harvey, Illinois 1—2
- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill. 1

CENTURY ELECTRIC CO., 1806 Pine Street, St. Louis 3, Mo. 3

- **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y. 1

CUMMINS ENGINE CO., INC., Fifth & Union, Columbus, Ind. 1

- **ELECTRIC MACHINERY MFG. CO.**, 800 Central Avenue, Minneapolis 13, Minn. 3

ELLIOTT COMPANY, Jeannette, Pa. 3—4

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill. 2—3

- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y. 3—4
- **HARNISCHFEGER CORP.**, 4400 W. National Ave., Milwaukee 46, Wisc. 1

HOBART BROTHERS CO., Hobart Square, Troy 1, Ohio 1—2—3—4

HOMELITE CORP., Riverdale Ave., Port Chester, N.Y. 2

- **LEROI COMPANY**, 1706 S. 68th St., Milwaukee 14, Wisc. 2
- **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill. 1
- **MURPHY DIESEL CO.**, 5317 W. Burnham St., Milwaukee 14, Wisc. 1
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc. 1

D. W. ONAN & SONS, INC., University Ave. S.E., at 25th, Minneapolis 14, Minn. 1—2

RELIANCE ELECTRIC & ENGR. CO., 1058 Ivanhoe Road, Cleveland 10, Ohio 3

UNIVERSAL MOTOR CO., 495 Universal Drive, Oshkosh, Wis. 1—2

- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J. 4

GLAZING COMPOUNDS, for Concrete Masonry Units

THE BURNS & RUSSELL CO., Tower Building, Baltimore 2, Md.

GRAPPLES (see Buckets)

GREASE (see Lubricants)

GRINDERS, for Detachable Bits (see Bits, Grinders)

GRINDING AIDS, Cement

- **DEWEY AND ALMY CHEMICAL CO.**, 62 Whittemore Ave., Cambridge 40, Mass.

GRINDING MEDIA, Mills

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

COATES STEEL PRODUCTS CO., P.O. Box 185, Greenville, Ill.

- **COLORADO FUEL & IRON CORP.**, P.O. Box 1920, Denver 1, Colo.
- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

THE PENNEBACKER CO., 3rd & Furnace Sts., Emmaus, Pa.

- **SHEFFIELD STEEL CORP.**, Sheffield Station, Kansas City 25, Mo.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.

GRINDING MILL CONTROLS, Feed Regulators

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

GRINDING PEBBLES (see Grinding Media)

GRIZZLIES (see Screens)

GUARDS, Machinery

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- **COLUMBIA MACHINE WORKS**, 107 South Grande Ave., Vancouver, Wash.
- **JOSEPH T. RYERSON & SON, INC.**, P.O. Box 8000-A, Chicago 80, Ill.

GUNS AND CARTRIDGES, Kiln Ring Removal

- **E. I. DU PONT DE NEMOURS & CO., INC.**, Nemours Building, Wilmington 98, Del.

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

- **INDUSTRIAL SALES DIVISION OF REMINGTON ARMS CO., INC.**, 939 Barnum Ave., Bridgeport 2, Conn.
- **THE STANDARD METAL MFG. CO.**, Malinta, Ohio

YAUN MFG. CO., Box 1508, Baton Rouge, La.

GUNS, Hydraulic Monitor (see Monitors, Hydraulic)

GYPSUM PLANT MACHINERY

- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
- **THE J. B. EHRSAM & SONS, MFG. CO.**, Enterprise, Kans.

THE GALION ALLSTEEL BODY CO., 605 S. Market Street, Galion, Ohio

THE HER-BORN ENGINEERING & MFG. CO., P.O. Box 666, Sandusky, Ohio

- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
- **STROH PROCESS STEEL CO.**, 1428 High St. N.S., Pittsburgh 12, Pa.
- **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

GYPSUM PLANTS, Engineers, Contractors

- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelhia 4, Pa.

- **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.

H

HAMMERMILLS (see Crushers, Hammer)

HARDENERS, Concrete

- **THE MASTER BUILDERS CO.**, Sub. of American-Marietta Co., Cleveland 3, Ohio

PHILADELPHIA QUARTZ CO., 1145 Public Ledger Bldg., Phiadelphia 6, Pa.

SIKA CHEMICAL CORP., 35 Gregory Ave., Passaic, N.J.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

SPRAY-O-BOND COMPANY, 2225 N. HUMBOLDT, Milwaukee 12, Wis.

TAMMS INDUSTRIES, INC., 228 N. LaSalle St., Chicago 1, Ill.

WYANDOTTE CHEMICALS CORP., Michigan Alkali Div., Wyandotte, Mich.

HARD SURFACING METALS (see Welding Rods, Hard Facing)

HEAT EXCHANGERS

- **THE BABCOCK & WILCOX CO.**, 85 Liberty St., New York 6, N.Y.

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.

- **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

MCNAMAR BOILER & TANK CO., 160 No. Rockford, Tulsa, Okla.

NATIONAL CARBON CO., Div. of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, N.Y.

- **F. L. SMIDTH & CO.**, 11 West 42nd. St., New York 36, N.Y.

HENRY VOGT MACHINE CO., 1000 W. Ormsby St., Louisville, Ky.

- **WESTERN PRECIPITATION CORP.**, 1016 W. Ninth St., Los Angeles 15, Calif.
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

YAUN MFG. CO., Box 1508, Baton Rouge, La.

YOUNG RADIATOR CO., 709 S. Marquette St., Racine, Wis.

HEAT TREATING MACHINES, Drill Steel

- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
- **GARDNER-DENVER CO.**, Quincy, Ill.

HEATERS, Concrete Mixer

HAUCK MFG. CO., 137-147 Tenth St., Brooklyn 15, N.Y.

LITTLEFORD BROS., INC., 451 E. Pearl St., Cincinnati 2, Ohio

HEATERS, Plant, Hot Air

BUFFALO FORGE CO., 490 Broadway, Buffalo 4, N.Y.

CLARAGE FAN COMPANY, Kalamazoo 16, Mich.

- **JACKSON & CHURCH CO.**, 321 N. Hamilton St., Saginaw, Mich.

PRAT-DANIEL CORP., 2 Meadow St., So. Norwalk, Conn.

- **SHORE ENGINERING CO.**, 320-322 Broadway, New York 7, N.Y.

HEAVY-MEDIA SEPARATION PROCESS

- **AMERICAN CYANAMID CO., MINERAL DRESSING DIV.**, 30 Rockefeller Plaza, New York 20, N.Y.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Cal.

HOISTS

- **AMERICAN HOIST & DERRICK CO.**, 63 S. Robert St., St. Paul 1, Minn.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

ANTHONY COMPANY, Streator, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.

- **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.

CHISHOLM-MOORE HOIST CORP., Fremont Avenue, Tonawanda, N.Y.

THE CLEVELAND CHAIN & MFG. CO., Broadway & Chaincraft Road, Cleveland 5, Ohio

- **CLIPPER MFG. COMPANY**, 2807 Warwick, Kansas City 8, Mo.

CLYDE IRON WORKS, INC., Duluth 7, Minn.

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa

DOWNS CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.

- **GARDNER-DENVER CO.**, Quincy, Ill.

GODFREY CONVEYOR CO., Wolfe & 13th Sts. Elkhart, Ind.

- **HARNISCHFEGER CORP.**, 4400 W. National Ave., Milwaukee 46, Wisc.
- **HERCULES STEEL PROD. CORP.**, Sherman Street, Galion, Ohio
- **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

- **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio
- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
- **W. A. JONES FOUNDRY & MACHINE CO.**, 4401 W. Roosevelt Road, Chicago 24, Ill.
- **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.

SHEPARD-NILES CRANE & HOIST CORP., Schuyler Ave., Montour Falls, N.Y.

- **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.

J. C. STEELE & SONS, INC., P.O. Box 951, Statesville, N.C.

STREET BROS. MACHINE CO., INC., 415 Dome Bldg., Chattanooga, Tenn.

SUPERIOR-LIDGERWOOD-MUNDY CORP., 1101 John Ave., Superior, Wis.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

WRIGHT HOIST DIV., American Chain & Cable Co., Inc., York, Pa.

HOPPERS, Aggregates, Cement, etc.

ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge 41, Mass.

- **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.

BETHLEHEM STEEL CO., Third Street, Bethlehem, Pa.

- **BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
- **L. BURMEISTER CO.**, 4535 W. Mitchell St., Milwaukee 14, Wisc.
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

- **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
- **GENERAL ENGINES CO., INC.**, 307 Hunter St., Gloucester City, N.J.

HARDY SCALES CO., 5701 S. Atlantic Blvd., Maywood, Calif.

- **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
- **C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
- **SINTERING MACHINERY CORP.**, Box 68, Netcong, N.J.

R. K. TYRA CO., Forest Lake, Minn.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

HOPPERS, Unloading Ready Mixed Concrete

- **BLAW-KNOX, CO.**, P.O. Box 1198 Pittsburgh 30, Pa.
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa

- **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
- **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
- **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

HOSE, Rubber

1. Hydraulic
2. Pneumatic
3. Oil
4. Sand

AEROQUIP CORP., 300 S. East Ave., Jackson, Mich.
1—2—3—4

AERO-COUPLING CORP., 3015 Winona Ave., Burbank, Calif.
1—2—3—4

- **THE AMERICAN RUBBER MFG. CO.**, 1145 Park Avenue, Oakland 8, Calif.
1—2—3—4

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.
1—2

BLACKHAWK MFG. CO., 5325 W. Rogers St., Milwaukee, Wis.
1

- **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.
1—2—3—4

THE CINCINNATI RUBBER MFG. CO., Cincinnati 12, Ohio
1—2—3—4

ERIE PUMP & ENGINE WORKS, 145 Glenwood Ave., Medina, N.Y.
4

- **GOODALL RUBBER CO.**, 403 Whitehead Road, Trenton 4, N.J.
1—2—3—4
- **B. F. GOODRICH CO.**, Akron 11, Ohio
1—2—3—4
- **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
2—3—4

THE GRAY CO., INC., 60—11th Ave. N.E., Minneapolis 13, Minn.
2—3

- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
1—2—3—4
- **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.
2
- **REPUBLIC RUBBER DIV.** of Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio
1—2—3—4
- **PIONEER RUBBER MILLS**, 353 Sacramento St., San Francisco 11, Calif.
1—2—3—4

QUAKER RUBBER CORP., Div. of H. K. Porter Co., Inc., Tacony & Comly Streets, Philadelphia 24, Pa.

- **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.
1—2—3—4
- **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.
1—2—3—4
- **U.S. STEEL SUPPLY DIV.** of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.
1—2—3—4
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
2

HOSE FITTINGS

AEROQUIP CORP., 300 S. East Ave., Jackson, Mich.

AERO-COUPLING CORP., 3015 Winona Ave., Burbank, Calif.

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DIRECTORY

- **CARLYLE RUBBER CO., INC.**, 62 Park Place, New York 7, N.Y.
- **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.

DIXON VALVE & COUPLING CO., Hancock St. & Columbia Ave., Philadelphia 22, Pa.

- **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.
- **REPUBLIC RUBBER Div.** of Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

- **NEW HAVEN VIBRATOR CO.**, 131 Chestnut St., P.O. Box 1669, New Haven 7, Conn.

C. A. NORGREN CO., 3400 S. Elati St., Englewood, Colo.

- **PIONEER RUBBER MILLS**, 353 Sacramento St., San Francisco 11, Calif.

QUAKER RUBBER CORP., Div. of H. K. Porter Co., Inc., Tacony & Comly Sts., Philadelphia 24, Pa.

- **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.
- **U.S. STEEL SUPPLY DIV.** of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

HULLS, Dredge (see Dredges)

HUMIDIFIERS, Laboratory (see Laboratory Apparatus)

HYDRAULIC CYLINDERS

BLACKHAWK MFG. CO., 5325 W. Rogers St., Milwaukee, Wis.

- **THE COMMERCIAL SHEARING & STAMPING CO.**, 1775 Logan Ave., P.O. Box 719, Youngstown 1, Ohio

CONSTRUCTION PROD. SALES, 4043 Goodwin Avenue, Los Angeles 39, Calif.

THE GALION ALLSTEEL BODY CO., 605 S. Market Street, Galion, Ohio

- **GAR WOOD IND., INC.**, Wayne Division, Wayne, Mich.

HENNEUSE ENG. CO., Marion, Ohio

- **HERCULES STEEL PROD. CORP.**, Sherman Street, Galion, Ohio

LEDEEN MFG. CO., 1600 S. San Pedro St., Los Angeles 15, Calif.

- **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio

ROGERS HYDRAULIC, INC., 7401 Walker St., Minneapolis 16, Minn.

- **WELLMAN ENGINEERING CO.**, 7000 Central Ave., Cleveland 4, Ohio

HYDRATORS, Lime

- **THE DORR CO. ENGRS.**, Barry Place, Stamford, Conn.
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.

OMEGA MACHINE CO., 345 Harris Ave., Providence 1, R.I.

- **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

HYDROSEPARATORS (see Sand Recovery Machinery)

I

IDLERS, Conveyor (see Conveyor Idlers)

INDICATORS, Bin (see Bin Level Indicators)

INSULATION, Heat (see Refractories)

INSTRUMENTS, Process Control

AMERICAN INSTRUMENT CO., Silver Spring, Md.

AUTOMATIC LIQUID METER CO., 1372-78 E. 15th St., Los Angeles 21, Calif.

- **BAILEY METER CO.**, 1050 Ivanhoe Road, Cleveland 10, Ohio

ARNOLD O. BECKMAN, INC., 1020 Mission St., South Pasadena, Calif.

THE BRISTOL CO., Waterbury 20, Conn.

THE DICKSON COMPANY, 7420 S. Woodlawn Ave., Chicago 19, Ill.

THE FOXBORO CO., 38 Neponset Ave., Foxboro, Mass.

- **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

THE HAYS CORP., Michigan City, Ind.

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.

- **M & M ENGR. CORP.**, 1017 W. 23rd St., Indianapolis 23, Ind.

NORTH AMERICAN PHILIPS CO., INC., 100 E. 42nd Street, New York 17, N.Y.

PRECISION SCIENTIFIC CO., 3737 W. Cortland St., Chicago 47, Ill.

J

JACKS, Hydraulic

BLACKHAWK MFG. CO., 5325 W. Rogers St., Milwaukee, Wis.

- **THE BUDA COMPANY**, 154th & Commercial, Harvey, Illinois.
- **THE COMMERCIAL SHEARING & STAMPING CO.**, 1775 Logan Ave., P.O. Box 719, Youngstown 1, Ohio

ROGERS HYDRAULIC, INC., 7401 Walker St., Minneapolis 16, Minn.

JIGS, Sand and Gravel

- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

K

KETTLES, Gypsum, Calcining

- **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.

KILN PARTS, ENDS, ETC.

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **STROH PROCESS STEEL CO.**, 1428 High St. N.S., Pittsburgh 12, Pa.
- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

KILNS, Curing, Concrete

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

CHAMPION FUEL ENGINE DIV., P.O. Box 3941, Detroit 27, Mich.

HENNEUSE ENG. CO., Marion, Ohio

LITTLEFORD BROS., INC., 451 E. Pearl St., Cincinnati 2, Ohio

MCNAMAR BOILER & TANK CO., 160 No. Rockford, Tulsa, Okla.

- **SHORE ENGINEERING CO.**, 320-322 Broadway, New York 7, N.Y.

KILNS, Lime, Vertical

- **THE ELLERNAN CO.**, 1210 Continental Bank Bldg., Salt Lake City 1, Utah
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

KILNS, Rotary, Cement, Gypsum, Lime

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **GENERAL AMERICAN TRANSPT. CORP.**, 139 So. 4th St., Louisville 2, Ky.
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **STROH PROCESS STEEL CO.**, 1428 High St. N.S., Pittsburgh 12, Pa.
- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

L

LABORATORY APPARATUS

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwukee 1, Wisc.

AMERICAN INSTRUMENT CO., Silver Spring, Md.

AUTOMATIC LIQUID METER CO., 1372-78 E. 15th St., Los Angeles 21, Calif.

CENTRAL SCIENTIFIC CO., 1700 Irving Park Road, Chicago 13, Ill.

- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.

FORNEY'S, INC., Elm & Russell Sts., New Castle, Pa.

THE HAYS CORP., Michigan City, Ind.

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

- **J. A. JONES CONCRETE MACHINERY CO.**, 108 Horning Road, Pittsburgh 34, Pa.

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.

- **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.

NORTH AMERICAN PHILIPS CO., INC., 100 E. 42nd Street, New York 17, N.Y.

PRECISION SCIENTIFIC CO., 3737 W. Cortland St., Chicago 47, Ill.

- **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
- **SYNTRON COMPANY**, 450 Lexington Ave., Homer City, Pa.
- **THE W. S. TYLER CO.**, 3615 Superior Ave., Cleveland 14, Ohio
- **UNIVERSAL VIBRATING SCREEN CO.**, Deane Blvd. & St. Paul RR, Racine, Wis.

CHARLES R. WATTS & CO., 4121 Sixth Ave. N.W., Seattle 7, Wash.

- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.

LABORATORIES, Testing

ACKER DRILL CO., INC., 721 W. Lackawanna Ave., Scranton 3, Pa.

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.
- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah

THE HAYS CORP., Michigan City, Ind.

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

- **J. A. JONES CONCRETE MACHINERY CO.**, 108 Horning Road, Pittsburgh 34, Pa.
- **SEPARATION PROCESS CO.**, Fuller Building, Catasauqua, Pa.
- **THE W. S. TYLER CO.**, 3615 Superior Ave., Cleveland 14, Ohio
- **UNIVERSAL VIBRATING SCREEN CO.**, Deane Blvd. & St. Paul RR, Racine, Wis.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.

LACING, Belt (see Belt Fasteners & Lacing)

LADDERS, Dredge

- **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
- **MORRIS MACHINE WORKS**, 20 E. Genesee St., Baldwinsville, N.Y.
- **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

LAUNDERS (see Chutes)

LIFT TRUCKS, Concrete Products, etc.

1. Gas
2. Electric
3. Gas-Electric

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2—3

AUTOMATIC TRANSPORTATION CO., 101 W. 87th St., Chicago 20, Ill.
2

BARRETT-CRAVENS CO., 4613 S. Western Blvd., Chicago 9, Ill.
2—3

- A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

- **BESSER MFG. CO.**, Alpena, Mich.
  1—2—3
- **THE BUDA COMPANY**, 154th & Commercial, Harvey, Illinois
  1
- **CLARK EQUIPMENT CO.**, Industrial Truck Div., Springfield Place, Battle Creek 60, Mich.
  1—2—3
- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
  1—2
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
  1

DROTT MFG. CORP., 3841 W. Wisconsin Ave., Milwaukee 8, Wisc.
1

- **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
  2—3
- **ERICKSON POWER LIFT TRUCKS, INC.**, 1401 Marshall St. N.E., Minneapolis 13, Minn.
  1
- **FLEMING MFG. CO.**, 105 Fleming Ave., Cuba, Missouri
  1—2—3

HENNEUSE MFG. CO., Marion, Ohio
1

- **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
  1

HYSTER COMPANY, 2918 N.E. Clackamas St., Portland 8, Ore.
1

- **THE KNICKERBOCKER CO.**, 603 Liberty St., Jackson, Mich.
  1
- **KWIK MIX COMPANY**, Port Washington, Wisc.
  1

LEWIS-SHEPARD PRODUCTS, INC., 125 Walnut St., Watertown 72, Mass.
2

LIFT TRUCKS INC., 2425 Spring Grove Ave., Cincinnati 14, Ohio
1

- **LULL MFG. CO.**, 134 W. 90th St., Minneapolis 20, Minn.
  1
- **PRASCHAK MFG. CO.**, Hwy. 13, South, Marshfield, Wisc.
  1

REVOLVATOR COMPANY, 86th at U.S. Rtes. 1 & 9, North Bergen, N.J.
2

SCHMIDGALL MFG. CO., 307 Cass Street, Peoria 2, Ill.
1

SERVICE CASTER & TRUCK CORP., Albion, Mich.
1—2

SILENT HOIST & CRANE CO., 895 63rd St., Brooklyn 20, N.Y.
1—2

- **TOWMOTOR CO.**, 1225 E. 152 St., Cleveland 10, Ohio
  1
- **TRACTO-LIFT COMPANY**, 800 E. 18th St., Kansas City 8, Mo.
  1—2—3

TRANSITIER TRUCK CO., 2477 N.W. 23rd Ave., Portland 10, Ore.
1

- **TRUCKMAN DIV. OF THE KNICKERBOCKER CO.**, 650 Liberty St., Jackson, Mich.
  2
- **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.
  1

LIGHTERS, Fuse (see Blasting Supplies)

LIME KILNS (see Kilns)

LIME AND LIMESTONE SPREADERS

- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.

EVEN SPREAD CO., Owensville, Ohio

- **HERCULES STEEL PROD CORP.**, Sherman Street, Galion, Ohio
- **THE SALEM TOOL CO.**, Box 235, Salem, Ohio

LIME MORTAR & PUTTY PLANTS

- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **MILLER-KOMLINE CO.**, P.O. Box 257, Peapack, N.J.
- **SERVICE ENGINEERING CO.**, Summit, N.J.

LIME PLANTS

- **THE DORR CO. ENGRS.**, Barry Place, Stamford, Conn.
- **THE ELLERNAN CO.**, 1210 Continental Bank Bldg., Salt Lake City 1, Utah
- **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
- **IOWA MFG. CO.**, 916 16th St. N.E., Cedar Rapids, Iowa
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
- **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
- **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave N.W., Cedar Rapids, Iowa

LINERS, Kiln (see Refractories)

LINERS, METAL, Grinding Mill

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

ELLIOTT COMPANY, Jeannette, Pa.

- **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
- **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.

THE PENNEBACKER CO., 3rd & Furnace Sts., Emmaus, Pa.

- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **THOMAS FOUNDRIES, INC.**, P.O. Box 1111, Birmingham 1, Ala.
- **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.

LINERS, Pump, Metal

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **THOMAS FOUNDRIES, INC.**, P.O. Box 1111, Birmingham 1, Ala.

LINERS, Pump, Rubber

- **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio

MAGIC CHEMICAL CO., 131 Crescent St., Brockton 2, Mass.

- **PIONEER RUBBER MILLS**, 353 Sacramento St., San Francisco 11, Calif.
- **RAYBESTOS-MANHATTAN, INC.**, 61 Willett St., Passaic, N.J.
- **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.

LININGS, CHUTE (see Chute Linings)

LOADERS

1. Boat
2. Car
3. Truck

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2—3

ATHEY PRODUCTS CORP., 5631 W. 65th St., Chicago 38, Ill.
1

BADGER MACHINE COMPANY, 1124 West 5th Street, Winona, Minnesota
3

- **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
  2—3

BARRETT-CRAVENS CO., 4613 S. Western Blvd., Chicago 9, Ill.
3

- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.
  2

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.
3

CLYDE IRON WORKS, INC., Duluth 1, Minn.
1—3

- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
  3
- **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah
  2—3
- **A. B. FARQUHAR CO.**, 142 N. Duke St., York, Pa.
  3

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.
2—3

- **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.
  3
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
  1
- **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
  1—2—3

A. H. KIESEL & SONS, 45 Grace Street, Tiffin, Ohio
3

- **LULL MFG. CO.**, 134 W. 90th St., Minneapolis 20, Minn.
  3

N. P. NELSON IRON WORKS, INC., 820 Bloomfield Ave., Clifton, N.J.
3

- **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
  3

REVOLVATOR COMPANY, 86th St. at U.S. Rts. 1 & 9, North Bergen, N.J.
3

SERVICE CASTER & TRUCK CORP., Albion, Mich.
3

SPROUT WALDRON & CO., INC., Muncy, Pa.
2

- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
  1—2—3

TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.
3

LOADERS

1. Tractor
2. Underground

- **ALLIS-CHALMERS MFG. CO., TRACTOR DIVISION**, P.O. Box 512, Milwaukee 1, Wisc.
  1

ATHAY PRODUCTS CORP., 5631 W. 65th St., Chicago 38, Ill.
1

BADGER MACHINE COMPANY, 1124 West 5th Street, Winona, Minnesota
1

- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
  2
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
  1

J. I. CASE COMPANY, 700 State Street, Racine, Wisconsin
1

- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
  1

CONSTRUCTION PROD. SALES, 4043 Goodwin Avenue, Los Angeles 39, Calif.
1

DROTT MFG. CORP., 3841 W. Wisconsin Ave., Milwaukee 8, Wisc.
1

- **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah
  1—2

HENNEUSE ENG. CO., Marion, Ohio
1

- **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
  1
- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.
  1
- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
  2
- **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
  2
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
  1—2
- **LULL MFG. CO.**, 134 W. 90th St., Minneapolis 20, Minn.
  1

MAINE STEEL, INC., 169 Front St., So. Portland 7, Maine
1

- **MIXERMOBILE MFRS.**, 8027 N.E. Killingsworth, Portland 16, Ore.
  1
- **THE OLIVER CORP.**, 400 W. Madison St., Chicago 6, Ill.
  1
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
  2

SERVICE SUPPLY CORP., Mfg. Division, 20th & Erie Ave., Philadelphia 24, Pa.
1—2

TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.
1

TRANSMISSION & GEAR CO., 10421 Haggerty Ave., Dearborn, Mich.
1

WAGNER IRON WORKS, 1905 S. First St., Milwaukee 1, Wis.
1

LOCOMOTIVES

1. Diesel
2. Electric
3. Gasoline
4. Oil (L.P.G.)
5. Storage Battery

THE ATLAS CAR & MFG. CO., 1140 Ivanhoe Road, Cleveland 10, Ohio
2—5

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

● **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.
1—2

DAVENPORT BESLER CORP., 2305 Rockingham Road, Davenport, Iowa
1—2—3

● **THE FATE-ROOT-HEATH CO.**, Plymouth, Ohio
1—2—3—4

● **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.
2—5

● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
2—5

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.
1—2—3—4—5

● **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.
1—2—3—4

LOCOMOTIVES

1. Diesel-Electric
2. Gasoline-Electric
3. Oil (L.P.G.)-Electric

THE ATLAS CAR & MFG. CO., 1140 Ivanhoe Road, Cleveland 10, Ohio
1

● **BALDWIN-LIMA-HAMILTON CORP.**, Eddystone Div., Philadelphia 42, Pa.
1

DAVENPORT BESLER CORP., 2305 Rockingham Road, Davenport, Iowa
1—2

FAIRBANKS-MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.
1—2—3

● **THE FATE-ROOT-HEATH CO.**, Plymouth, Ohio
1

● **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.
1

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.
1—2—3

● **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.
1—2

LOG WASHERS, Aggregates (see Scrubbers)

LORRIES, WEIGH (see Weigh Lorries)

LUBRICANTS, Grease, Oil, etc.

ALEMITE DIV., STEWART-WARNER CORP., 1826 Diversey Pkway., Chicago 14, Ill.

JOSEPH DIXON CRUCIBLE CO., 167 Wayne St., Jersey City 3, N.J.

DOW CORNING CORP., Midland, Mich.

LUBRIPLATE DIV., FISKE BROTHERS REFINING CO., 129 Lockwood St., Newark 5, N.J.

MID-CONTINENT PETROLEUM CORP., P.O. Box 381, Tulsa, Okla.

SHELL OIL COMPANY, 50 W. 50th St., New York 20, N.Y.

SHELL OIL COMPANY, 100 Bush St., San Francisco 6, Calif.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

STANDARD OIL COMPANY OF CALIF., 225 Bush St., San Francisco 20, Calif.

STANDARD OIL COMPANY, 910 S. Michigan Ave., Chicago 5, Ill.

SUN OIL COMPANY, 1608 Walnut St., Philadelphia 3, Pa.

SWAN-FINCH OIL CORP., 205 E. 42nd St., New York 17, N.Y.

● **THE TEXAS COMPANY**, 135 East 42nd St., New York 17, N.Y.

THE WHITMORE MFG. CO., P.O. Box 1646, Sta. C., Cleveland 4, Ohio

LUBRICANTS, Wire Rope

ALEMITE DIV., STEWART-WARNER CORP., 1826 Diversey Pkway., Chicago 14, Ill.

LUBRICATE DIV., FISKE BROTHERS REFINING CO., 129 Lockwood St., Newark 5, N.J.

● **A. LESCHEN & SONS ROPE CO.**, 5909 Kennerly Ave., St. Louis 12, Mo.

● **MACWHYTE COMPANY**, 2949-14th Ave., Kenosha, Wisc.

SHELL OIL COMPANY, 50 W. 50th St., New York 20, N.Y.

SHELL OIL COMPANY, 100 Bush St., San Francisco 6, Calif.

L. SONNEBORN SONS, INC., Building Products Div., 80 Eighth Ave., New York 11, N.Y.

STANDARD OIL COMPANY OF CALIF., 225 Bush St., San Francisco 20, Calif.

STANDARD OIL COMPANY, 910 S. Michigan Ave., Chicago 5, Ill.

SUN OIL COMPANY, 1608 Walnut St., Philadelphia 3, Pa.

SWAN-FINCH OIL CORP., 205 E. 42nd St., New York 17, N.Y.

● **THE TEXAS COMPANY**, 135 East 42nd St., New York 17, N.Y.

THE WHITMORE MFG. CO., P.O. Box 1640, Sta. C., Cleveland 4, Ohio

LUBRICATING SYSTEMS

ALEMITE DIV., STEWART-WARNER CORP., 1826 Diversey Pkway., Chicago 14, Ill.

THE GRAY CO., INC., 60—11th Ave. N.E., Minneapolis 13, Minn.

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

C. A. NORGREN CO., 3400 S. Elati St., Englewood, Colo.

OIL-RITE CORP., 2318 Waldo Blvd., Manitowoc, Wisc.

M

MAGNETIC SEPARATORS

● **CARBOLOY DEPT. GENERAL ELECTRIC CO.**, 11177 E. Eight Mile Rd., Detroit 32, Mich.

THE ELECTRIC CONTROLLER & MFG. CO., 2700 East 79th Street, Cleveland 4, Ohio

ERIEZ MANUFACTURING CO., 9 Magnet Drive, Erie 6, Penn.

● **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.

THE HOMER MFG. CO., INC., Dept. 205, Lima, Ohio

● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio

SPROUT WALDRON & CO., INC., Muncy, Pa.

● **STEARNS MAGNETIC, INC.**, 675 S. 28th St., Milwaukee 46, Wis.

TROBRIDGE CONVEYOR CO., 851 Van Houten Ave., Clifton, N.J.

UNITED STATES HOFFMAN MACHRY CORP., 105 Fourth Ave., New York 3, N.Y.

MASONRY COLORS (see Cement and Masonry Colors)

MASONRY SAWS

CHAMPION MFG. COMPANY, 2028 Washington Ave., St. Louis 3, Mo.

● **CLIPPER MFG. COMPANY**, 2807 Warwick, Kansas City 8, Mo.

● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa

VICTOR ENGINEERING CORP., 15 Maple Ave., Paoli, Pa.

MEASURING DEVICES

1. Weight
2. Volumetric (See Batchers)

● **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
1—2

HARDY SCALES CO., 5701 S. Atlantic Blvd., Maywood, Calif.
1

● **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
1—2

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.
1

RICHARDSON SCALE CO., 668-698 Van Houten Ave., Clifton, N.J.
1

SCIENTIFIC CONCRETE SERVICE CORP., 724 Salem Ave., Elizabeth 3, N.J.
1

METERS

1. Electric
2. Water
3. Other Fluids

AUTOMATIC LIQUID METER CO., 1372-78 E. 15th St., Los Angeles 21, Calif.
2

● **BAILEY METER CO.**, 1050 Ivanhoe Road, Cleveland 10, Ohio
2—3

● **BESSER MFG. CO.**, Alpena, Mich.
2

BUILDERS-PROVIDENCE, INC., 345 Harris Avenue, Providence 1, R.I.
2—3

● **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
2

● **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
2

THE FOXBORO CO., 38 Neponset Ave., Foxboro, Mass.
2—3

● **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.
1

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.
3

NEPTUNE METER CO., 50 W. 50th St., New York 20, N.Y.
2—3

● **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
2—3

MILLS, Grinding

1. Ball
2. Compartment
3. Laboratory
4. Rod
5. Roll Type
6. Tube

● **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
1—2—4—5—6

● **THE BABCOCK & WILCOX CO.**, 161 W. 42nd St., New York 17, N.Y.
1

● **BRADLEY PULVERIZER CO.**, 123 S. Third St., Allentown, Pa.
5

CENTRAL SCIENTIFIC CO., 1700 Irving Park Road, Chicago 13, Ill.
3

● **COMBUSTION ENGR.-SUPERHEATER, INC.**, Raymond Pulverizer Div., 1319 N. Branch St., Chicago 22, Ill.
3—5

● **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
1—4

● **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah
1—4

● **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah
1—3

● **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
1—2—3—4—6

● **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
1—4—5—6

● **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
3—5

● **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
1—2—3—4—5—6

● **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
1—5

● **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.
1—2—3—4—5—6

● **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
1—2—4—6

PULVERIZING MACHINERY CO., Chatham Road, Summit, N.J.
3

● **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
1—2—3—6

SPROUT WALDRON & CO., INC., Muncy, Pa.
5

● **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
1—3—4

J. C. STEELE & SONS, INC., P.O. Box 951, Statesville, N.C.
5

STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
1—2

● **STROH PROCESS STEEL CO.**, 1428 High St. N.S., Pittsburgh 12, Pa.
1—5

● **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
3—5

● **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
1—2—4—6

● **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.
1

● **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa
5

● **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.
1—2—6

● **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.
3

MILLS, Washing (see Scrubbers)

MILLS, Hammer (see Crushers, Hammer)

MIXER BODIES, Truck (see Bodies)

MIXERS, Concrete (see Concrete Mixers)

MIXERS, Plaster & Mortar

● **J. W. APPLEY & SON, INC.**, 831 9th St. North, St. Petersburg 2, Fla.

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa

GILSON BROTHERS CO., Fredonia, Wisc.

- **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio
- **THE KNICKERBOCKER CO.**, 603 Liberty St., Jackson, Mich.
- **KWIK MIX COMPANY**, Port Washington, Wisc.
- **MULTIPLEX MACHINERY CO.**, 1430 Fremont St., Elmore, Ohio
- **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

MIXERS, Pugmill

- **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
- **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **KWIK MIX COMPANY**, Port Washington, Wisc.
- **W. A. RIDDELL CORP.**, Bucyrus, Ohio
- **SINTERING MACHINERY CORP.**, Box 68, Netcong, N.J.

STANDARD STEEL CORP., 5036 Boyle Ave., Los Angeles 58, Calif.

J. C. STEELE & SONS, INC., P.O. Box 951, Statesville, N.C.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

MIXERS, Slurry (see Slurry Mixers)

MONITORS, Hydraulic

- **GEORGIA IRON WORKS CO.**, 605 12th St., Augusta, Ga.

MORTAR COLORS (see Cement and Masonry Colors)

MOTOR TRACTORS, Off-HIGHWAY

1. Diesel
2. Gas

- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
  1

CONSTRUCTION PROD. SALES, 4043 Goodwin Avenue, Los Angeles 39, Calif.
2

- **COOK BROS. EQUIP. CO.**, 1815 N. Broadway, Los Angeles 31, Calif.
  1—2
- **THE EUCLID ROAD MACHINERY CO.**, 1361 Chardon Road, Cleveland 17, Ohio
  1

FEDERAL MOTOR TRUCK DIV., Federal Fawick Corp., 5780 Federal Ave., Detroit 9, Mich.
1—2

- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.
  1—2
- **KOEHRING COMPANY**, 3026 W. Concordia Ave., Milwaukee 16, Wis.
  1—2
- **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.
  1

MARMON-HERRINGTON CO., INC., 1511 W. Washington St., Indianapolis 7, Ind.
1—2

- **STERLING DIV., THE WHITE MOTOR CO.**, 2021 S. 54th St., Milwaukee 1, Wis.
  1—2

MOTOR TRUCK CONCRETE MIXERS (see Bodies)

MOTOR TRUCK DRIVES AND DIFFERENTIALS, Special

- **AMERICAN STEEL FOUNDRIES**, 400-410 N. Michigan Ave., Chicago 11, Ill.
  (Heavy Duty 5th Wheel)

DETROIT AUTOMOTIVE PROD. CORP., 8701 Grinnell Ave., Detroit 13, Mich.

MARMON-HERRINGTON CO., INC., 1511 W. Washington St., Indianapolis 7, Ind.

- **SIX WHEELS, INC.**, 1584 E. 20th St., Los Angeles 54, Calif.

TRUCK ENGINEERING CORP., 1285 W. 70th St., Cleveland 2, Ohio

THE TRUCKSTOR CORPORATION, Route No. 29, Mountainside, N.J.

MOTOR TRUCKS, Highway

AUTOCAR CO., Lancaster Pike, Ardmore, Pa.

- **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio
- **CHEVROLET MOTOR DIV. OF G.M.C.**, General Motors Building, Detroit 2, Michigan
- **COOK BROS. EQUIP. CO.**, 1815 N. Broadway, Los Angeles 31, Calif.

DART TRUCK CO., 2623 Oak St., Kansas City 8, Mo.

DIAMOND T MOTOR CAR CO., 4401 W. 26th Street, Chicago 23, Illinois

- **DODGE DIV. OF CHRYSLER CORP.**, 7900 Jos. Campau St., Detroit 31, Mich.

DUPLEX TRUCK CO., 830 E. Hazel St., Lansing 4, Mich.

FEDERAL MOTOR TRUCK DIV., Federal Fawick Corp., 5780 Federal Ave., Detroit 9, Mich.

- **FORD DIV., FORD MOTOR CO.**, P.O. Box 658, Dearborn, Michigan

THE FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis.

- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.

KENWORTH MOTOR TRUCK CORP., 8801 E. Marginal Way, Seattle 88, Wash.

MACK MOTOR TRUCK CORP., 350 Fifth Ave., New York 1, N.Y.

- **STERLING DIV., THE WHITE MOTOR CO.**, 2021 S. 54th St., Milwaukee 1, Wis.

MOTOR TRUCKS, Off-Highway End, Side, Bottom, Dump, etc.

AUTOCAR CO., Lancaster Pike, Ardmore, Pa.

- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.
- **COOK BROS. EQUIP. CO.**, 1815 N. Broadway, Los Angeles 31, Calif.

DART TRUCK CO., 2623 Oak St., Kansas City 8, Mo.

DIAMOND T MOTOR CAR CO., 4401 W. 26th Street, Chicago 23, Illinois

- **DODGE DIV., CHRYSLER CORP.**, 7900 Jos. Campau St., Detroit 31, Mich.

DUPLEX TRUCK CO., 830 E. Hazel St., Lansing 4, Mich.

- **THE EUCLID ROAD MACHINERY CO.**, 1361 Chardon Road, Cleveland 17, Ohio

FEDERAL MOTOR TRUCK DIV., Federal Fawick Corp., 5780 Federal Ave., Detroit 9, Mich.

- **FORD DIV., FORD MOTOR CO.**, P.O. Box 658, Dearborn, Michigan

THE GALION ALLSTEEL BODY CO., 605 S. Market Street, Galion, Ohio

- **GAR WOOD INDUSTRIES, INC.**, Richmond Div., 4th & Wright Sts., Richmond, Calif.
- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.

KENWORTH MOTOR TRUCK CORP., 8801 E. Marginal Way, Seattle 88, Wash.

- **KOEHRING COMPANY**, 3026 W. Concordia Ave., Milwaukee 16, Wis.
- **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.

MACK MOTOR TRUCK CORP., 350 Fifth Ave., New York 1, N.Y.

MARMON-HERRINGTON CO., INC., 1511 W. Washington St., Indianapolis 7, Ind.

MEMPHIS EQUIPMENT CO., 766 So. Third St., Memphis 6, Tenn.

TRUCK ENGINEERING CORP., 1285 W. 70th St., Cleveland 2, Ohio

- **STERLING DIV., THE WHITE MOTOR CO.**, 2021 S. 54th St., Milwaukee 1, Wis.

MOTOR TRUCK TRACTORS, Highway

1. Diesel
2. Gasoline

AUTOCAR CO., Lancaster Pike, Ardmore, Pa.
1—2

- **COOK BROS. EQUIP. CO.**, 1815 N. Broadway, Los Angeles 31, Calif.
  1—2

DART TRUCK CO., 2623 Oak St., Kansas City 8, Mo.
1—2

DIAMOND T MOTOR CAR CO., 4401 W. 26th Street, Chicago 23, Illinois
1—2

- **DODGE DIV., CHRYSLER CORP.**, 7900 Jos. Campau St., Detroit 31, Mich.
  2

FEDERAL MOTOR TRUCK DIV., Federal Fawick Corp., 5780 Federal Ave., Detroit 9, Mich.
1—2

- **FORD DIV., FORD MOTOR CO.**, P.O. Box 658, Dearborn, Michigan
  2
- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.
  1—2

KENWORTH MOTOR TRUCK CORP., 8801 E. Marginal Way, Seattle 88, Wash.
1—2

MACK MOTOR TRUCK CORP., 350 Fifth Ave., New York 1, N.Y.
1—2

- **STERLING DIV., THE WHITE MOTOR CO.**, 2021 S. 54th St., Milwaukee 1, Wis.
  1—2

MOTORS (see Electric Motors)

N

NOZZLES, Spray

BETE FOG NOZZLE, INC., 85 Pierce St., Greenfield, Mass.

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.

BUFFALO FORGE CO., 490 Broadway, Buffalo 4, N.Y.

- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
- **COLORCRETE INDUSTRIES, INC.**, 510 Ottawa Ave., Holland, Mich.
- **THE DEISTER CONCENTRATOR CO.**, 901 Glasgow Ave., Fort Wayne 1, Ind.
- **THE DEISTER MACHINE CO.**, 1933 E. Wayne St., Fort Wayne 4, Ind.

DIXON VALVE & COUPLING CO., Hancock St. & Columbia Ave., Philadelphia 22, Pa.

- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **NEW HAVEN VIBRATOR CO.**, 131 Chestnut St., P.O. Box 1669, New Haven 7, Conn.

NOZZLES, Washing

BETE FOG NOZZLE, INC., 85 Pierce St., Greenfield, Mass.

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.

- **THE DEISTER CONCENTRATOR CO.**, 901 Glasgow Ave., Fort Wayne 1, Ind.
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **REPUBLIC RUBBER DIV.**, Lee Rubber & Tire Corp., Albert Street, Youngstown 2, Ohio

O

OFFBEARERS, Power, Concrete Block

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

- **COLUMBIA MACHINE WORKS**, 107 South Grand Ave., Vancouver, Wash.
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
- **LITH-I-BAR CO.**, 54 W. Eighth St., Holland, Mich.
- **STEARNS MFG. CO., INC.**, Beecher St., Adrian, Mich.

J. C. STEELE & SONS, INC., P.O. Box 951, Statesville, N.C.

OIL BURNERS

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **THE BABCOCK & WILCOX CO.**, 161 W. 42nd St., New York 17, N.Y.

CLEAVER-BROOKS CO., 326 E. Keefe Ave., Milwaukee 12, Wisc.

(COMBUSTION EQUIPMENT DIV.,) Todd Shipyards Corp., 81-16, 45th Ave., Elmhurst, Queens, N.Y.

HAUCK MFG. CO., 137-147 Tenth St., Brooklyn 15, N.Y.

JOHNSTON MFG. CO., 2825 E. Hennepin Ave., Minneapolis 13, Minn.

NATIONAL AIROIL BURNER CO., 1284 E. Sedgley Ave., Philadelphia 34, Pa.

- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

STAPLES & PFEIFFER, 528 Bryant St., San Francisco 7, Calif.

OIL FILTERS

FRAM CORPORATION, Providence 16, R.I.

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

NATIONAL AIROIL BURNER CO., 1284 E. Sedgley Ave., Philadelphia 34, Pa.

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DIRECTORY

UNITED STATES HOFFMAN MACHINERY CORP., 105 Fourth Ave., New York 3, N.Y.

• WINSLOW ENGINEERING CO., 4069-73 Hollis St., Oakland 8, Calif.

WIX ACCESSORIES CORP., E. Ozark Ave., Gastonia, N.C.

Oil, Lubricants (see Lubricants)

P

PALLETS, Concrete Products

1. Steel
2. Wood
3. Other

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
1—2—3

BARTILE CORP. OF AMERICA, 1930 Wilshire Blvd., Suite 204, Los Angeles 5, Calif.
1

• BESSER MFG. CO., Alpena, Mich.
1

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.
1

CHASE CONCRETE MACHINERY CO., 94 Grandview Ave., Buffalo 23, N.Y.
1

• COLUMBIA MACHINE WORKS, 107 South Grand Ave., Vancouver, Wash.
1—2—3

• THE COMMERCIAL SHEARING & STAMPING CO., 1775 Logan Ave., P.O. Box 719, Youngstown 1, Ohio
1

• CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
1

• THE FROG, SWITCH & MFG. CO., Carlisle, Pa.
1

• GENERAL ENGINES CO., INC., 307 Hunter St., Gloucester City, N.J.
1—3

• LITH-I-BAR CO., 54 W. Eighth St., Holland, Mich.
1—2

MISHCO CORP., 615 S.W. 2nd Ave., Miami, Fla.
1—3

• MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio
1—3

• THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.
1

TEXAS FOUNDRIES, INC., P.O. Box 180, 1611 N. Raguet, Lufkin, Texas.
1—2

R. K. TYRA CO., Forest Lake, Minn.
1

• U.S. STEEL SUPPLY DIV. of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.
1

PALLET CLEANERS

• BESSER MFG. CO., Alpena, Mich.

• COLUMBIA MACHINE WORKS, 107 South Grand Ave., Vancouver Wash.

• THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio

• STEARNS MFG. CO., INC., Beecher St., Adrian, Mich.

PANEL BOARDS, Electric

• ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.

PANS, GRINDING, Wet and Dry

• AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO., 389 E. 14th St., Chicago Heights, Ill.

• EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa

• KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N.Y.

• MCLANAHAN & STONE CORP., 200 Wall St., Hollidaysburg, Pa.

• W. A. RIDDELL CORP., Bucyrus, Ohio

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

PANS, APRON, CONVEYOR (see Conveyors, Apron)

PERFORATED METAL (see Screen Plate)

PERLITE EXPANDING EQUIPMENT

PHOTO-ELECTRIC CELLS

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

PILLOW BLOCKS (see Blocks, Pillow)

PIPE, Asbestos

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N.Y.

PIPE, Dredge, Standard

• AMERICAN BRAKE SHOE CO., 230 Park Ave., New York 17, N.Y.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N.Y.

• JONES & LAUGHLIN STEEL CORP., 401 Liberty Ave., Gateway Center, Pittsburgh 30, Pa.

REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio

• TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N.J.

YAUN MFG. CO., Box 1508, Baton Rouge, La.

PIPE FITTINGS

ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N.Y.

• GEORGIA IRON WORKS CO., 605 12th St., Augusta, Ga.

HAYNES STELLITE CO., Div. of Union Carbide & Carbon Co., So. Lindsay Street, Kokomo, Indiana

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N.Y.

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

VICTAULIC COMPANY OF AMERICA, P.O. Box 509, Elizabeth, N.J.

WALLWORTH COMPANY, 60 East 42nd St., New York 17, N.Y.

PIPE, Rubber Lined

• THE EIMCO CORP., P.O. Box 300, Salt Lake City 10, Utah

• THE GALIGHER CO., 545 W. 8th South St., Salt Lake City 4, Utah

• GOODALL RUBBER CO., 403 Whitehead Road, Trenton 4, N.J.

• B. F. GOODRICH CO., Akron 11, Ohio

• THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio

• HEWITT-ROBINS, INC., 666 Glenbrook Road, Stamford, Conn.

MAGIC CHEMICAL CO., 131 Crescent St., Brockton 2, Mass.

• RAYBESTOS-MANHATTAN, INC., 61 Willett St., Passaic, N.J.

• UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N.Y.

PLANERS, Shale

• EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines 4, Iowa

PLASTER MACHINERY

• CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.

PLASTER MIXERS (see Mixers, Plaster)

PNEUMATIC CONVEYORS (see Conveyors, Air)

POLISHING MACHINES, Concrete

STOW MANUFACTURING CO., 49 Shear St., Binghamton, N.Y.

PONTOONS, Dredge and Pipe

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

YAUN MFG. CO., Box 1508, Baton Rouge, La.

PORTABLE AGGREGATES PLANTS, Crushing and Screening Plants (see Crushing and Screening Plants, Mobile Mounted)

POWDER, Blasting (see Explosives and Dynamite)

POWER STATION EQUIPMENT

• ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

• CHAIN BELT COMPANY, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

• THE GOODYEAR TIRE & RUBBER CO., INC., 1144 E. Market St., Akron 16, Ohio

• THE JEFFREY MFG. CO., 935 N. Fourth St., Columbus 16, Ohio

• NORDBERG MFG. CO., 3073 S. Chase Ave., Milwaukee 1, Wisc.

PRECIPITATORS, Dust, Electrical (see Dust Collectors, Electrical)

PREHEATERS, for Kilns, etc.

• KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N.Y.

• F. L. SMIDTH & CO., 11 West 42nd St., New York 36, N.Y.

PROPORTIONING EQUIPMENT (see Batchers)

PROTECTIVE COATINGS

A. C. HORN CO., INC., 10th St. & 44th Ave., Long Island City 1, N.Y.

MAGIC CHEMICAL CO., 131 Crescent St., Brockton 2, Mass.

• RUST-OLEUM CORP., 2425 Oakton St., Evanston, Ill.

SPRAY-O-BOND COMPANY, 2225 N. Humboldt, Milwaukee 12, Wis.

TRUCSON LABORATORIES, Milwaukee Jct. P.O., Detroit 11, Mich.

PULLERS, Car (see Car Movers)

PULLERS, Gear, Wheel and Bearing

• ARMSTRONG-BRAY & CO., 5340 Northwest Highway, Chicago 30, Ill.

BLACKHAWK MFG. CO., 5325 W. Rogers St., Milwaukee, Wis.

ROGERS HYDRAULIC, INC., 7401 Walker St., Minneapolis 16, Minn.

PULLEYS, Clutch

• BONDED SCALE & MACHINE CO., Columbus 7, Ohio

• CONTINENTAL GIN CO., 4500 5th Ave. S., Birmingham, Ala.

• DODGE MFG. CORP., Mishawaka, Ind.

• LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

J. C. STEELE & SONS, INC., P.O. Box 951, Statesville, N.C.

PULLEYS, Conveyor and Elevator

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

• BONDED SCALE & MACHINE CO., Columbus 7, Ohio

• CARLYLE RUBBER CO., INC., 62 Park Place, New York 7, N.Y.

• CONTINENTAL GIN CO., 4500 5th Ave. S., Birmingham, Ala.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

• DODGE MFG. CORP., Mishawaka, Ind.

• THE J. B. EHRSAM & SONS MFG. CO., Enterprise, Kans.

• GEO. HAISS MFG. CO., INC., Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.

• HEWITT-ROBINS, INC., 666 Glenbrook Road, Stamford, Conn.

• IOWA MFG. CO., 916-16th St. N.E., Cedar Rapids, Iowa

• THE JEFFREY MFG. CO., 935 N. Fourth St., Columbus 16, Ohio

• W. A. JONES FOUNDRY & MACHINE CO., 4401 W. Roosevelt Road, Chicago 24, Ill.

• LINK-BELT COMPANY, 307 N. Michigan Ave., Chicago 1, Ill.

• LIPPMANN ENGINEERING WORKS, 4603 W. Mitchell St., Milwaukee 14, Wis.

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- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.

E. F. MARSH ENGR. CO., 4324 W. Clayton Ave., St. Louis 10, Mo.

- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.

SPROUT WALDRON & CO., INC., Muncy, Pa.

- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave N.W., Cedar Rapids, Iowa
- **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

PULLEYS, Magnetic (see Magnetic Separators)

PULP DENSITY CONTROLLERS

THE BRISTOL CO., Waterbury 20, Conn.

- **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.

PULVERIZER FUEL SYSTEMS (see Coal Pulverizing Equipment, Direct Firing)

PULVERIZERS (see Mills)

PUMPS, Air Lift

1. Cement
2. Slurry
3. Water

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
  1—2—3
- **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.
  3
- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
  2
- **FULLER COMPANY**, Catasauqua, Pa.
  1
- **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.
  1—2

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.
3

- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
  1—2
- **A. R. WILFLEY & SONS, INC.**, P.O. Box 2330, Denver 1, Colo.
  1

PUMPS, Asphalt

THE GRAY CO., INC., 60-11th Ave., N.E., Minneapolis 13, Minn.

- **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

PUMPS, Cement

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **FULLER COMPANY**, Catasauqua, Pa.
- **GARDNER-DENVER CO.**, Quincy, Ill.
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **LINCOLN ENGINEERING CO.**, 5701 Natural Bridge Ave., St. Louis 20, Mo.

MARLOW PUMPS, Box 566, Ridgewood, N.J.

- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.

PUMPS, Concrete

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
- **JACKSON & CHURCH CO.**, 321 N. Hamilton St., Saginaw, Mich.

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.

MARLOW PUMPS, Box 566, Ridgewood, N.J.

PUMPS, Dredge

- **THE ALLEN-SHERMAN-HOFF CO.**, 259 E. Lancaster Ave., Wynnewood, Pa.
- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.

ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N.Y.

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

- **GEORGIA IRON WORKS CO.**, 605 12th St., Augusta, Ga.
- **HETHERINGTON & BERNER, INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.

LAWRENCE PUMPS, INC., 371 Market St., Lawrence, Mass.

MARLOW PUMPS, Box 566, Ridgewood, N.J.

- **MORRIS MACHINE WORKS**, 20 E. Genesee St., Baildwinsville, N.Y.
- **NAGLE PUMPS, INC.**, 1249 Center Ave., Chicago Heights, Ill.

PEKOR IRON WORKS, INC., P.O. Lock Drawer 909, Columbus, Ga.

- **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **THOMAS FOUNDRIES, INC.**, P.O. Box 1111, Birmingham 1, Ala.
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
- **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

PUMPS, Sand

- **THE ALLEN-SHERMAN-HOFF CO.**, 259 E. Lancaster Ave., Wynnewood, Pa.
- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- **THE DORR CO. ENGRS.**, Barry Place, Stamford, Conn.

ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N.Y.

FAIRBANKS MORSE CO., 600 S. Michigan Ave., Chicago 5, Ill.

- **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah
- **HETHERINGTON & BERNER INC.**, 701-745 Kentucky Ave., Indianapolis 2, Ind.

LAWRENCE PUMPS, INC., 371 Market St., Lawrence, Mass.

MARLOW PUMPS, Box 566, Ridgewood, N.J.

- **MORRIS MACHINE WORKS**, 20 E. Genesee St., Baldwinsville, N.Y.
- **NAGLE PUMPS, INC.**, 1249 Center Ave., Chicago Heights, Ill.

PEKOR IRON WORKS, INC., P.O. Lock Drawer 909, Columbus, Ga.

- **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **THOMAS FOUNDRIES, INC.**, P.O. Box 1111, Birmingham 1, Ala.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.
- **A. R. WILFLEY & SONS, INC.**, P.O. Box 2330, Denver 1, Colo.
- **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

PUMPS, Slurry

- **THE ALLEN-SHERMAN-HOFF CO.**, 259 E. Lancaster Ave., Wynnewood, Pa.
- **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

BYRON JACKSON CO., P.O. Box 2017 Terminal Annex, Los Angeles 54, Calif.

THE DEMING CO., 838 Morris Ave., Salem, Ohio

- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- **THE DORR CO. ENGRS.**, Barry place, Stamford, Conn.

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

- **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah
- **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.

- **KOEHRING COMPANY**, 3026 W. Concordia Ave., Milwaukee 16, Wis.

LAWRENCE PUMPS, INC., 371 Market St., Lawrence, Mass.

MCNALLY PITTSBURG MFG. CORP., 307 W. 3rd Street, Pittsburg, Kansas

MARLOW PUMPS, Box 566, Ridgewood, N.J.

- **MORRIS MACHINE WORKS**, 20 E. Genesee St., Baldwinsville, N.Y.
- **NAGLE PUMPS, INC.**, 1249 Center Ave., Chicago Heights, Ill.

OLIVER UNITED FILTERS, INC., 33 W. 42nd St., New York 36, N.Y.

- **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.
- **A. R. WILFLEY & SONS, INC.**, P.O. Box 2330, Denver 1, Colo.
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.

PUMPS

1. Centrifugal
2. Deep Well
3. Diaphragm
4. Rubber-Lined
5. Vacuum
6. Hydraulic

- **THE ALLEN-SHERMAN-HOFF PUMP CO.**, 259 E. Lancaster Ave., Wynnewood, Pa.
  4
- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
  1—4—5
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
  1

BLACKHAWK MFG. CO., 5325 W. Rogers St., Milwaukee, Wis.
6

BUFFALO FORGE CO., 490 Broadway, Buffalo 4, N.Y.
1—4

BYRON JACKSON CO., P.O. Box 2017 Terminal Annex, Los Angeles 54, Calif.
1—2—6

CARVER PUMP COMPANY, 1056 Hershey Ave., Muscatine, Iowa
1—3

CENTRAL SCIENTIFIC CO., 1700 Irving Park Road, Chicago 13, Ill.
5

- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
  1
- **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.
  1—5
- **THE COMMERCIAL SHEARING & STAMPING CO.**, 1775 Logan Ave., P.O. Box 719, Youngstown 1, Ohio
  6

CONSTRUCTION MACHINERY CO'S, Glenwood & Vinton S.E., Waterloo, Iowa
1—3

THE DEMING CO., 838 Morris Ave., Salem, Ohio
2

- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
  4
- **THE DORR CO. ENGRS.**, Barry Place, Stamford, Conn.
  3

ERIE PUMP AND ENGINE WORKS, 145 Glenwood Ave., Medina, N.Y.
1

FAIRBANKS MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.
1—2

- **FULLER COMPANY**, Catasauqua, Pa.
  3
- **THE GALIGHER CO.**, 545 W. 8th South St., Salt Lake City 4, Utah
  1—4
- **GARDNER-DENVER CO.**, Quincy, Ill.
  1
- **GAR WOOD IND., INC.**, Wayne Division, Wayne, Mich.
  6
- **HERCULES STEEL PROD. CORP.**, Sherman Street, Galion, Ohio
  6

HOMELITE CORP., Riverdale Ave., Port Chester, N.Y.
1

- **INDEPENDENT PNEUMATIC TOOL CO.**, 175 N. State St., Aurora, Ill.
  1

INGERSOLL-RAND CO., 11 Broadway, New York 4, N.Y.
1—2—5—6

- **THE JAEGER MACHINE CO.**, 550 W. Spring St., Columbus 16, Ohio
  1—3

LAWRENCE PUMPS, INC., 371 Market St., Lawrence, Mass.
1

LAYNE & BOWLER, INC., P.O. Box 6697, Hollywood Sta., Memphis 8, Tenn.
1—2

LEDEEN MFG. CO., 1600 S. San Pedro St., Los Angeles 15, Calif.
6

LINCOLN ENGINEERING CO., 5701 Natural Bridge Ave., St. Louis 20, Mo.
6

MCCULLOCH MOTORS CORP., 6101 W. Century Blvd., Los Angeles 45, Calif.
1

MARLOW PUMPS, Box 566, Ridgewood, N.J.
1—3

- **MORRIS MACHINE WORKS**, 20 E. Genesee St., Baldwinsville, N.Y.
  1

PEKOR IRON WORKS, INC., P.O. Lock Drawer 909, Columbus, Ga.
1

- A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

PENNSYLVANIA PUMP & COMPRESSOR CO., Bushkill Drive, Easton, Pa.
1—5

• RAYBESTOS-MANHATTAN, INC., 61 Willett St., Passaic, N.J.
4

RODGERS HYDRAULIC, INC., 7401 Walker St., Minneapolis 16, Minn.
5

• TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N.J.
1

VERNON TOOL CO., LTD., 1101 Meridian Ave., Alhambra, Calif.
1

VICKERS INCORPORATED, 1400 Oakman Blvd., Detroit 32, Mich.
5

• WESTERN MACHINERY CO., 760 Folsom St., San Francisco 7, Calif.
1—3—4

• A. R. WILFLEY & SONS, INC., P.O. Box 2330, Denver 1, Colo.
1—4

• WORTHINGTON CORPORATION, Worthington Ave., Harrison, N.J.
1—2—3

• YUBA MFG. CO., 351 California St., San Francisco 4, Calif.
1

PYROMETERS

• BAILEY METER CO., 1050 Ivanhoe Road, Cleveland 10, Ohio

THE BRISTOL CO., Waterbury 20, Conn.

• CAMBRIDGE INSTRUMENT CO., INC., Grand Central Terminal, New York 17, N.Y.

THE FOXBORO CO., 38 Neponset Ave., Foxboro, Mass.

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

LEEDS & NORTHRUP CO., 4970 Stenton Ave, Philadelphia 44, Pa.

• F. L. SMIDTH & CO., 11 W. 42nd St., New York 18, N.Y.

TAMMS INDUSTRIES, INC., 228 N. LaSalle St., Chicago 1, Ill.

R

RACKS, Curing, Concrete Masonry

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

• J. W. APPLEY & SON, INC., 831 9th St. North, St. Petersburg 2, Fla.

• BESSER MFG CO., Alpena, Mich.

THE CHASE FOUNDRY & MFG. CO., 2300 Parsons Avenue, Columbus 7, Ohio

• COLUMBIA MACHINE WORKS, 107 South Grand Ave., Vancouver, Wash.

• FLEMING MFG. CO., 105 Fleming Ave., Cuba, Missouri

• THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio

LEWIS-SHEPARD PRODUCTS, INC., 125 Walnut St., Watertown 72, Mass.

• LITH-I-BAR CO., 54 W. Eighth St., Holland, Mich.

• MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio

• THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.

• STEARNS MFG. CO., 600 E. Beecher St., Adrian, Mich.

• STROH PROCESS STEEL CO., 1428 High St. N.S., Pittsburgh 12, Pa.

R. K. TYRA CO., Forest Lake, Minn.

• WITTEMANN MACHINERY CO., Farmingdale, N.J.

RAILS, Relay

• MIDWEST STEEL CORP., 514 Dryden St., Charleston 1, W. Va.

• NORDBERG MFG. CO., 3073 S. Chase Ave., Milwaukee 1, Wisc.

RAILWAY, Industrial Equipment

• AMERICAN BRAKE SHOE CO., 230 Park Ave., New York 17, N.Y.

• BALDWIN-LIMA-HAMILTON CORP., Eddystone Div., Philadelphia 42, Pa.

THE C. S. CARD IRON WKS. CO., P.O. Box 117, Denver 1, Colo.

• EASTON CAR & CONSTRUCTION CO., Easton, Pa.

• THE FRANK G. HOUGH CO., 939 Sunnyside Ave., Libertyville, Ill.

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.

RAILWAYS, Electric

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

READY-MIXED CONCRETE PLANTS (see Batching Plants)

READY MIXED TRUCKS (see Bodies, Ready Mixed Concrete)

RECORDERS, Concrete Batching

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

HARDY SCALES CO., 5701 S. Atlantic Blvd., Maywood, Calif.

RECORDERS

1. Draft
2. Pressure
3. Temperature

• BAILEY METER CO., 1050 Ivanhoe Road, Cleveland 10, Ohio
1—2—3

THE BRISTOL CO., Waterbury 20, Conn.
1—2—3

BUILDERS-PROVIDENCE, INC., 345 Harris Avenue, Providence 1, R.I.
2—3

THE DICKSON COMPANY, 7420 S. Woodlawn Ave., Chicago 19, Ill.
1—2—3

THE FOXBORO CO., 38 Neponset Ave., Foxboro, Mass.
2—3

THE HAYS CORP., Michigan City, Ind.
1—2

LEEDS & NORTHRUP CO., 4970 Stenton Ave., Philadelphia 44, Pa.
1—2—3

RECTIFIERS, Electric

• ALLIS-CHALMERS MFG. CO., 975 S. 70th St., Milwaukee 1, Wis.

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

• SYNTRON COMPANY, 450 Lexington Ave., Homer City, Pa.

RECUPERATORS, Waste Heat

REFRACTORIES, Block, Brick, Insulation

AMERICAN VERMICULITE CORP., 654 Madison Ave., New York 21, N.Y.

• THE BABCOCK & WILCOX CO., 161 W. 42nd St., New York 17, N.Y.

THE CARBORUNDUM COMPANY, Refractories Division, Perth Amboy, N.J.

CHICAGO FIRE BRICK CO., 1467 Elston Avenue, Chicago 22, Ill.

JOSEPH DIXON CRUCIBLE CO., 167 Wayne St., Jersey City 3, N.J.

GENERAL REFRACTORIES CO., 1520 Locust St., Philadelphia 2, Pa.

A. P. GREEN FIRE BRICK CO., Mexico, Mo.

JOHNS-MANVILLE, 22 E. 40th St., New York 16, N.Y.

• KAISER ALUMINUM & CHEMICAL SALES, INC., 1924 Broadway, Oakland, Calif.

LACLEDE-CHRISTY CO., Arcade Bldg., St. Louis 1, Mo.

MEXICO REFRACTORIES CO., Love & Cole Sts., Mexico, Mo.

GEORGE F. PETTINOS, INC., 1206 Locust St., Philadelphia 7, Pa.

PLIBRICO CO., 1800 N. Kingsbury St., Chicago 14, Illinois

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.

REFRACTORY & INSULATION CORP., 120 Wall St., New York 5, N.Y.

• W. A. RIDDELL CORP., Bucyrus, Ohio

• TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N.J.

WALSH REFRACTORIES CORP., 101 Ferry St., St. Louis 7, Mo.

ZONOLITE CO., 135 S. LaSalle St., Chicago 3, Ill.

REGULATORS, Feed Water

THE HAYS CORP., Michigan City, Ind.

C. A. NORGREN CO., 3400 S. Elati St., Englewood, Colo.

REGULATORS, Draft, Pressure, Temperature (see Controls)

REGULATORS, Voltage

• ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

RESPIRATORS

MINE SAFETY APPLIANCES CO., 230 N. Braddock Ave., Pittsburgh 8, Pa.

WILLSON PRODUCTS, INC., 2nd & Washington Sts., Reading, Pa.

REVOLUTION COUNTERS (see Tachometers)

REVOLVING CRANES (see Derricks, Stiffleg or Guy)

RHEOSTATS

• GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.

ROCK SPLITTERS, for Stone-Faced Masonry

• DES PLAINES CONCRETE MACHINERY CO., Box 152, Des Plaines, Ill.

SPLIT-ROCK PRODUCTS, 13201 W. Burleigh St., Milwaukee 10, Wis.

ROCK WOOL CUPOLAS AND EQUIPMENT

WHITING CORPORATION, 157th & Lathrop, Harvey, Ill.

RODS, for Grinding Mills

• ALLIS-CHALMERS MFG. CO., 975 So. 70th St., Milwaukee 1, Wisc.

• THE CALIFORNIA WIRE CLOTH CORP., 1080 19th Avenue, Oakland 6, Calif.

• COLORADO FUEL & IRON CORP., P.O. Box 1920, Denver 1, Colo.

• HARDINGE CO., INC., 240 Arch St., York, Pa.

• SHEFFIELD STEEL CORP., Sheffield Station, Kansas City 25, Mo.

• TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

RODS, Welding, Hard-facing (see Welding Rods, Hard-facing)

RODS, Welding (see Welding Rods and Electrodes)

ROLLER BEARINGS (see Bearings)

ROOFING AND SIDING, Industrial

BARTILE CORP. OF AMERICA, 1930 Wilshire Blvd., Suite 204, Los Angeles 5, Calif.

• CHASE BAG COMPANY, 309 W. Jackson Blvd., Chicago 6, Ill.

• THE TEXAS COMPANY, 135 East 42nd St., New York 17, N.Y.

• UNITED STATES STEEL CORP., 525 William Penn Place, Pittsburgh 30, Pa.

• U.S. STEEL SUPPLY DIV., of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.

ROPE, Manila, Sisal, Jute, etc.

ROPE, Wire (see Wire Rope)

RUBBER LININGS (see Chute Linings, Rubber)

S

SAFETY EQUIPMENT, Goggles, Shoes, etc.

E. D. BULLARD CO., 275 Eighth St., San Francisco 3, Calif.

EDMONT MANUFACTURING CO., 1200 Walnut St., Coshocton, Ohio

GENERAL SCIENTIFIC EQUIPMENT CO., 27th & Huntingdon Sts., Philadelphia 32, Pa.

• GOODALL RUBBER CO., 403 Whitehead Road, Trenton 4, N.J.

• B. F. GOODRICH CO., Akron 11, Ohio

INDUSTRIAL PROD. CO., 2705 N. Fourth St., Philadelphia 33, Pa.

MINE SAFETY APPLIANCES CO., 230 N. Braddock Ave., Pittsburgh 8, Pa.

• UNITED STATES RUBBER CO., 1230 Ave. of the Americas, New York 20, N.Y.

WILLSON PRODUCTS, INC., 2nd & Washington Sts., Reading, Pa.

SAMPLING EQUIPMENT

ACKER DRILL CO., INC., 721 W. Lackawanna Ave., Scranton 3, Pa.

• ALLIS-CHALMERS MFG. CO., 975 S. 70th St., Milwaukee 1, Wis.

• FULLER COMPANY, Fuller Bldg., Catasauqua, Pa.

• THE GALIGHER CO., 545 W. 8th South St., Salt Lake City 4, Utah

• A dot before name indicates ROCK PRODUCTS Advertiser

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SAND DRAGS (see Sand Recovery Machinery)

SAND-LIME BRICK MACHINERY (see Brick Machinery)

SAND RECOVERY MACHINERY, Cones, Classifiers, Dewaterers, Drags, etc.

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- **ANDERSON ENGINEERING CO.**, 225-243 Bent St., Cambridge 41, Mass.
- **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
- **COLORADO IRON WORKS CO.**, 1624, 17th Street, Denver 2, Colo.
- **THE CONVEYOR CO.**, 3260 E. Slauson Ave., Los Angeles 58, Calif.
- **COYLE & ROTH**, 3024 Fourth St. S.E., Minneapolis, Minn.
- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
- **THE DORR CO. ENGRS.**, Barry Place, Stamford, Conn.
- **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
- **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah
- **GENERAL AMERICAN TRANSPORTATION CORP.**, 135 So. LaSalle St., Chicago 90, Ill.
- **GEORGIA IRON WORKS CO.**, 605 12th St., Augusta, Ga.
- **GRUENDLER CRUSHER & PULV. CO.**, 2915 N. Market St., St. Louis 6, Mo.
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
- **E. F. MARSH ENGR. CO.**, 4324 W. Clayton Ave., St. Louis 10, Mo.
- **THE MINE & SMELTER SUPPLY CO.**, P.O. Box 5270-Terminal Annex, Denver 17, Colo.
- **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
- **WM. E. ROBINSON & CO.**, 3633 Spring Garden St., Philadelphia 4, Pa.
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
- **SIMPLICITY ENGINEERING CO.**, 213 S. Oak St., Durand, Mich.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **SMITH ENGINEERING WORKS**, 532 East Capitol Dr., Milwaukee 12, Wis.
- **STRAUB MFG. CO.**, 507 Chestnut St., Oakland 7, Calif.
- **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
- **THE W. S. TYLER CO.**, 3615 Superior Ave., Cleveland 14, Ohio
- **UNITED IRON WORKS CO.**, 108 No. Locust St., Pittsburg, Kans.
- **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa
- **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N.Y.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.

SANDERS, Cast Stone

- **CHICAGO PNEUMATIC TOOL CO.**, 6 East 44th St., New York 17, N.Y.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

SCALES, Batching (see Batchers)

SCALES, Conveyor (see Feeders)

SCALES, Hopper

- **BEAUMONT BIRCH CO.**, 1505 Race St., Philadelphia 2, Pa.
- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
- **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wis.
- **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
- **THE CONVEYOR CO.**, 3260 E. Slauson Ave., Los Angeles 58, Calif.
- **ERIE STEEL CONST.**, P.O. Box 1031, Erie, Pa.
- **FAIRBANKS MORSE & CO.**, 600 S. Michigan Ave., Chicago 5, Ill.
- **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis, Mo.
- **HARDY SCALES CO.**, 5701 S. Atlantic Blvd., Maywood, Calif.
- **THE HOWE SCALE CO.**, Rutland, Vt.
- **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
- **RICHARDSON SCALE CO.**, 668-698 Van Houten Ave., Clifton, N.J.

SCALES, Laboratory

- **AMERICAN INSTRUMENT CO.**, Silver Springs, Md.
- **CENTRAL SCIENTIFIC CO.**, 1700 Irving Park Road, Chicago 13, Ill.
- **DENVER EQUIPMENT CO.**, 1410 Seventeenth St., Denver 17, Colo.
- **FAIRBANKS MORSE & CO.**, 600 S. Michigan Ave., Chicago 5, Ill.
- **GENERAL SCIENTIFIC EQUIPMENT CO.**, 27th & Huntingdon Sts., Philadelphia 32, Pa.
- **HUMBOLDT MFG. CO.**, 2014 N. Whipple St., Chicago 47, Ill.

SCALES, Lorry (see Weigh Lorries)

SCALES, Proportioning (see Batchers)

SCALES, Truck, Railway

- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
- **FAIRBANKS MORSE & CO.**, 600 S. Michigan Ave., Chicago 5, Ill.
- **HARDY SCALE CO.**, 5701 S. Atlantic Blvd., Maywood, Calif.
- **THE HOWE SCALE CO.**, Rutland, Vt.

SCRAPERS, Power Drag (see Cable Excavators)

SCAPERS, Tractor

- **BUCYRUS-ERIE CO.**, South Milwaukee, Wis.
- **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
- **THE EUCLID ROAD MACHINERY CO.**, 1361 Chardon Road, Cleveland 17, Ohio
- **GAR WOOD IND., INC.**, Findlay Division, Findlay, Ohio
- **THE HEIL COMPANY**, 3000 W. Montana St., Milwaukee 1, Wisc.
- **HENNEUSE ENG. CO.**, Marion, Ohio
- **ISAACSON IRON WORKS**, 2917 E. Marginal Way, Seattle 14, Wash.
- **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.
- **PULLMAN-STANDARD CAR MFG. CO.**, 79 E. Adams Street, Chicago 3, Ill.
- **WOOLDRIDGE MFG. CO.**, Hendy Ave., Sunnyvale, Calif.

SCREEN CLOTH, Woven-Wire (see Wire Cloth)

SCREEN HEATERS

- **F. R. HANNON & SONS**, 1603 Wayne Rd. S.E., Canton 7, Ohio
- **UNIVERSAL VIBRATING SCREEN CO.**, Deane Blvd. & St. Paul RR, Racine, Wis.

SCREEN PLATE, Perforated

- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
- **THE C. S. CARD IRON WKS. CO.**, P.O. Box 117, Denver 1, Colo.
- **COLORADO FUEL & IRON CORP.**, P.O. Box 1920, Denver 1, Colo.
- **CROSS ENGINEERING CO.**, Manufactures, Carbondale, Pa.
- **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
- **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
- **HENDRICK MFG. CO.**, Dundaff Street, Carbondale, Pa.
- **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
- **JOSEPH T. RYERSON & SON, INC.**, P.O. Box 8000-A, Chicago 80, Ill.
- **SIMPLICITY ENGINEERING CO.**, 213 S. Oak St., Durand, Mich.
- **SMITH ENGINEERING WORKS**, 532 E. Capitol Dr., Milwaukee 12, Wis.
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
- **U.S. STEEL SUPPLY DIV.**, of United States Steel Co., 208 S. LaSalle St., Chicago 4, Ill.
- **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.

SCREENING PLANTS, Portable (see Crushing and Screening Plants Portable)

SCREENS

1. Gravity
2. Grizzley
3. Laboratory
4. Revolving
5. Scrubber
6. Vibrating & Shaker
7. Gyrating

- **THE ABBEY-SCHERER CO.**, 304 Railroad St., Box 132, El Monte, Calif.
  2—4—6
- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
  4—5—6
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
  2—6
- **ANCHOR CONCRETE MACHINERY CO.**, 1191 Fairview Ave., Columbus 12, Ohio
  1—2—3—4—5—6
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
  4—6
- **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio
  4—6
- **THE C. O. BARTLETT AND SNOW CO.**, 6200 Harvard Ave., Cleveland 5, Ohio
  6
- **BODINSON MFG. CO.**, 2401 Bayshore Blvd., San Francisco 24, Calif.
  4—5—6
- **BONDED SCALE & MACHINE CO.**, Columbus 7, Ohio
  1—2—4—5—6
- **THE C. S. CARD IRON WKS. CO.**, P.O. Box 117, Denver 1, Colo.
  2
- **CENTRAL SCIENTIFIC CO.**, 1700 Irving Park Road, Chicago 13, Ill.
  3
- **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.
  4—6
- **CHICAGO PERFORATING CO.**, 2445 W. 24th Pl., Chicago 8, Ill.
  3—4—5—6
- **COLORADO FUEL & IRON CORP.**, P.O. Box 1920, Denver 1, Colo.
  2—6
- **THE CONVEYOR CO.**, 3260 E. Slauson Ave., Los Angeles 58, Calif.
  2
- **COYLE & ROTH**, 3024 Fourth St. S.E., Minneapolis, Minn.
  4—5—6
- **CROSS ENGINEERING CO.**, Manufacturers, Carbondale, Pa.
  4—6
- **THE DEISTER CONCENTRATOR CO.**, 901 Glasgow Ave., Fort Wayne 1, Ind.
  1—6
- **DEISTER MACHINE CO.**, 1933 E. Wayne St., Fort Wayne 4, Ind.
  6
- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
  6
- **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
  4—5—6
- **GRUENDLER CRUSHER & PULV. CO.**, 2915 N. Market St., St. Louis 6, Mo.
  4—5—6
- **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N.Y.
  1—2—4—5—6
- **HENDRICK MFG. CO.**, Dundaff Street, Carbondale, Pa.
  2—3—4—5—6
- **W. P. HEINEKIN CO.**, 30 Broad St., New York 3, N.Y.
  4—6
- **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
  6
- **HUMBOLDT MFG. CO.**, 2014 N. Whipple St., Chicago 47, Ill.
  3
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
  2—4—5—6
- **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
  2—6
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
  1—2—4—5—6

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

- **KENSINGTON STEEL CO.**, 505 Kensington Ave., Chicago 28, Ill.
  2
- **KOLMAN MFG. CO.**, West 12th St. Rd., Sioux Falls, S.D.
  6
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
  1—2—4—5—6
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
  2—4—5—6
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
  4—6
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
  2—6

  OVERSTROM & SONS, 2213 W. Mission Road, Alhambra, Calif.
  2—3—6
- **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.
  1—2—4—5—6
- **PRASCHAK MACHINE CO.**, Hwy. 13, South, Marshfield, Wisc.
  4

  PRECISION SCIENTIFIC CO., 3737 W. Cortland St., Chicago 47, Ill.
  3—6
- **PRODUCTIVE EQUIPMENT CORP.**, 2926 West Lake Street, Chicago 12, Illinois
  3—6
- **PETTIBONE MULLIKEN CORP., IMPACT MASTER DIV.**, 4700 W. Division St., Chicago 51, Ill.
  2—4—5—6
- **W. A. RIDDELL CORP.**, Bucyrus, Ohio
  1—6
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
  2—4—5—6
- **ROSS SCREEN & FEEDER CO.**, 19 Rector St., New York 6, N.Y.
- **SCREEN EQUIPMENT CO., INC.**, 1754 Walden Ave., Buffalo 25, N.Y.
  5
- **SIMPLICITY ENGINEERING CO.**, 213 S. Oak St., Durand, Mich.
  6
- **SMITH ENGINEERING WORKS**, 532 East Capitol Dr., Milwaukee 12, Wis.
  6

  STAR WIRE SCREEN & IRON WORKS, 2515 San Fernando Rd., Los Angeles 65, Calif.
  1—2—3—4—5—6

  STEDMAN FOUNDRY & MACHINE CO., INC., 507 Indiana Ave., Aurora, Ind.
  6
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
  2—4—5—6

  STRAUB MFG. CO., 507 Chestnut St., Oakland 7, Calif.
  4—6
- **STURTEVANT MILL COMPANY**, 102 Clayton St., Dorchester, Boston 22, Mass.
  3—6
- **SYNTRON COMPANY**, 450 Lexington Ave., Homer City, Pa.
  2—6
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
  2—6
- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
  2—4—5
- **THE W. S. TYLER CO.**, 3615 Superior Ave., Cleveland 14, Ohio
  1—2—3—5—6

  UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.
  2—4—6
- **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa
  2—4—5—6
- **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N.Y.
  3—4
- **UNIVERSAL VIBRATING SCREEN CO.**, Deane Blvd. & St. Paul RR, Racine, Wis.
  3—4—6

  VERNON TOOL CO., LTD., 1101 Meridian Ave., Alhambra, Calif.
  6

  VIBRO-PLUS PRODUCTS, INC., 54-11 Queens Blvd., Woodside 77, N.Y.
  6
- **WILLIAMS PATENT CRUSHER & PULV. CO.**, 2701 No. Broadway, St. Louis 6, Mo.
  6
- **WITTEMANN MACHINERY CO.**, Farmingdale, N.J.
  6
- **YUBA MFG. CO.**, 351 California St., San Francisco 4, Calif.
  4

SCREW CONVEYORS (see Conveyors, Screw)

SCRUBBERS, Crushed Stone, Gravel

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
- **AUSTIN-WESTERN CO.**, Aurora, Ill.
- **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio

  BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

  THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.
- **DENVER EQUIPMENT CO.**, 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- **DIAMOND IRON WORKS, INC.**, 1728 North 2nd St., Minneapolis 11, Minn.
- **THE DORR CO., INC.**, Barry Place, Stamford, Conn.
- **EAGLE IRON WORKS**, 137 Holcomb Ave., Des Moines 4, Iowa
- **GEORGIA IRON WORKS CO.**, 605 12th St., Augusta, Ga.
- **GRUENDLER CRUSHER & PULV. CO.**, 2915 N. Market St., St. Louis 6, Mo.
- **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
- **IOWA MFG. CO.**, 916-16th St. N.E., Cedar Rapids, Iowa
- **KENNEDY VAN SAUN MFG. & ENG. CORP.**, 2 Park Ave., New York 16, N.Y.
- **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
- **PETTIBONE MULLIKEN CORP., IMPACT MASTER DIV.**, 4700 W. Division St., Chicago 51, Ill.
- **PIONEER ENGR. WORKS, INC.**, 1515 Central Ave., Minneapolis 13, Minn.

  WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.
- **ROGERS IRON WORKS CO.**, 11th & Pearl Sts., Joplin, Mo.
- **SCREEN EQUIPMENT CO., INC.**, 1754 Walden Ave., Buffalo 25, N.Y.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **SMITH ENGINEERING WORKS**, 532 East Capitol Dr., Milwaukee 12, Wis.
- **THE STEARNS-ROGER MFG. CO.**, 1720 California St., Denver 2, Colo.
- **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
- **THE W. S. TYLER CO.**, 3615 Superior Ave., Cleveland 14, Ohio

  UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.
- **UNIVERSAL ENGINEERING CORP.**, 617 C. Ave. N.W., Cedar Rapids, Iowa
- **UNIVERSAL ROAD MACHINERY CO.**, 27 Emerick St., Kingston, N.Y.
- **WESTERN MACHINERY CO.**, 760 Folsom St., San Francisco 7, Calif.

SEAL RINGS, Kiln

- **W. P. HEINEKIN CO.**, 50 Broad St., New York 3, N.Y.
- **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N.Y.
- **TRAYLOR ENGINEERING & MFG. CO.**, Allentown, Pa.
- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

SEPARATORS, Air (see Air Separators)

SEPARATORS, Electrostatic (see Classifiers)

SEPARATORS, Magnetic (see Magnetic Separators)

SHEAVES

1. Wire Rope
2. V. Belt

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.
  2
- **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
  1
- **AMERICAN HOIST & DERRICK CO.**, 63 S. Robert St., St. Paul 1, Minn.
  1
- **AMERICAN MANGANESE STEEL DIV. OF AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
  1

  BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
  1
- **DIAMOND IRON WORKS, INC.**, 1728 N. 2nd Street, Minneapolis 11, Minn.
  2
- **DODGE MFG. CORP.**, Mishawaka, Ind.
  2

  DOWNS CRANE & HOIST CO., 540 W. Vernon Ave., Los Angeles 37, Calif.
  1
- **THE J. B. EHRSAM & SONS MFG. CO.**, Enterprise, Kans.
  1—2

  FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas
  2
- **THE FROG SWITCH & MFG. CO.**, Carlisle, Pa.
  1
- **JOY MFG. CO.**, Henry W. Oliver Bldg., Pittsburgh 22, Pa.
  1
- **MCLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.
  2
- **NORDBERG MFG. CO.**, 3073 S. Chase Ave., Milwaukee 1, Wisc.
  1
- **SAUERMAN BROS. INC.**, 530 S. Clinton St., Chicago 7, Ill.
  1
- **STROH PROCESS STEEL CO.**, 1428 High St. N.S., Pittsburgh 12, Pa.
  1
- **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N.J.
  1

  THE TOOL STEEL GEAR & PINION CO., 211 Township Ave., Cincinnati 16, Ohio
  1—2
- **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.
  1

SHOVELS, Crawler Mounted

1. Diesel
2. Electric
3. Gasoline
4. Electric Generator

- **AMERICAN HOIST & DERRICK CO.**, 63 S. Robert St., St. Paul 1, Minn.
  1—2—3—4

  AMERICAN STEEL DREDGE CO., INC., 2511 Taylor St., Fort Wayne 1, Ind.
  1—3
- **AUSTIN WESTERN CO.**, 601 N. Farnsworth Ave., Aurora, Ill.
  1—2—3—4
- **BALDWIN-LIMA-HAMILTON CORP.**, Construction Equipment Div., South Main St., Lima, Ohio
  1—2—3
- **BAY CITY SHOVELS, INC.**, Bay City, Michigan
  1—2—3
- **BUCYRUS-ERIE CO.**, South Milwaukee, Wisc.
  1—2—3—4
- **THE EIMCO CORP.**, P.O. Box 300, Salt Lake City 10, Utah
  1—2—3
- **GAR WOOD IND., INC.**, Findlay Division, Findlay, Ohio
  1—2—3—4

  THE HANSON CLUTCH & MACHINERY CO., Wall & Mimai Sts., Tiffin 15, Ohio
  1—3
- **HARNISCHFEGER CORP.**, 4400 W. National Ave., Milwaukee 46, Wisc.
  1—2—3—4
- **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
  1—3

  HYSTER COMPANY, 2918 N.E. Clackamas St., Portland 8, Ore.
  1
- **INSLEY MFG. CORP.**, 801 N. Olney St., Indianapolis 6, Ind.
  1—2—3—4
- **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.
  1—3
- **KOEHRING COMPANY**, 3026 W. Concordia Ave., Milwaukee 16, Wisc.
  1—2—3—4
- **LINK-BELT SPEEDER CORP.**, 1201 Sixth St. S.W., Cedar Rapids, Iowa
  1—2—3—4
- **MANITOWOC ENGR. CORP.**, So. 16th St., Manitowoc, Wisc.
  1—3
- **MARION POWER SHOVEL CO.**, 617 W. Center St., Marion, Ohio
  1—2—3

  MICHIGAN POWER SHOVEL CO., Miller Street, Benton Harbor, Mich.
  1—3
- **NORTHWEST ENGINEERING CO.**, 135 S. LaSalle St., Chicago 3, Ill.
  1—2—3
- **OSGOOD-GENERAL**, 1205 Cheney Ave., Marion, Ohio
  1—2—3
- **THE THEW SHOVEL CO.**, E. 28th St. & Fulton Rd., Lorain, Ohio
  1—2—3—4

  TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.
  1
- **UNIT CRANE & SHOVEL CORP.**, 6411 W. Burnham St., Milwaukee, Wis.
  1—2—3
- **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N.J.
  3

SHOVELS, Tractor

- **ALLIS-CHALMERS MFG. CO., TRACTOR DIV.**, P.O. Box 512, Milwaukee 1, Wis.

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

BADGER MACHINE COMPANY, 1124 West 5th Street, Winona, Minnesota

- BUCYRUS-ERIE CO., South Milwaukee, Wis.
- CATERPILLAR TRACTOR CO., Peoria 8, Ill.

CONSTRUCTION PROD. SALES, 4043 Goodwin Avenue, Los Angeles 39, Calif.

DROTT MFG. CORP., 3841 W. Wisconsin Ave., Milwaukee 8, Wisc.

- THE EIMCO CORP., P.O. Box 300, Salt Lake City 10, Utah

HENNEUSE ENG. CO., Marion, Ohio

- THE FRANK G. HOUGH CO., 939 Sunnyside Ave., Libertyville, Ill.
- INTERNATIONAL HARVESTER CO., 180 N. Michigan Ave., Chicago 1, Ill.
- LINK-BELT SPEEDER CORP., 1201 Sixth St. S.W., Cedar Rapids, Iowa
- LULL MFG. CO., 134 W. 90th St., Minneapolis 20, Minn.

MAINE STEEL, INC., 169 Front St., So. Portland 7, Maine

- THE OLIVER CORP., 400 W. Madison St., Chicago 6, Ill.

SERVICE SUPPLY CORP., Mfg. Division, 20th & Erie Ave., Philadelphia 24, Pa.

TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.

SHOVELS, Truck-Mounted

BADGER MACHINE COMPANY, 1124 West 5th Street, Winona, Minnesota

- BALDWIN-LIMA-HAMILTON CORP., Construction Equipment Div., South Main St., Lima, Ohio
- BAY CITY SHOVELS, INC., Bay City, Michigan
- BUCYRUS-ERIE CO., South Milwaukee, Wis.
- THE EIMCO CORP., P.O. Box 300, Salt Lake City 10, Utah
- GAR WOOD IND., INC., Findlay Division, Findlay, Ohio

THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio

- HARNISCHFEGER CORP., 4400 W. National Ave., Milwaukee 46, Wisc.
- INSLEY MFG. CORP., 801 N. Olney St., Indianapolis 6, Ind.
- KOEHRING COMPANY, 3026 W. Concordia Ave., Milwaukee 16, Wis.
- LINK-BELT SPEEDER CORP., 1201 Sixth St. S.W., Cedar Rapids, Iowa

MICHIGAN POWER SHOVEL CO., Miller Street, Benton Harbor, Mich.

- NORTHWEST ENGINEERING CO., 135 S. LaSalle St., Chicago 3, Ill.
- OSGOOD-GENERAL, 1205 Cheney Ave., Marion, Ohio
- "QUICK-WAY" TRUCK SHOVEL CO., 2400 E. 40th Ave., Denver 5, Colo.
- SCHIELD BANTAM CO., 216 Park St., Waverly, Iowa
- THE THEW SHOVEL CO., E. 28th St. & Fulton Rd., Lorain, Ohio
- UNIT CRANE & SHOVEL CORP., 6411 W. Burnham St., Milwaukee 14, Wis.

SHREDDERS, Plaster

- THE JEFFREY MFG. CO., 935 N. Fourth St., Columbus 16, Ohio
- WILLIAMS PATENT CRUSHER & PULV. CO., 2701 No. Broadway, St. Louis 6, Mo.

SIEVES, Testing

HUMBOLDT MFG. CO., 2014 N. Whipple St., Chicago 47, Ill.

- SYNTRON CO., 450 Lexington, Homer City, Pa.
- THE W. S. TYLER CO., 3615 Superior Ave., Cleveland 14, Ohio

SILOS, Storage

- BAUGHMAN MFG. CO., INC., Shipman Road, Jerseyville, Ill.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- CONCRETE SILO CO., P.O. Box 346, Bloomfield, Ind.
- FLEMING MFG. CO., 4985 Fyler Ave., St. Louis, Mo.

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.

- C. S. JOHNSON CO., P.O. Box 71, Champaign, Ill.
- MACDONALD ENGR. CO., 188 W. Randolph St., Chicago 1, Ill.
- THE MARIETTA CONCRETE CORP., Westview, Marietta, Ohio

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

SINTERING MACHINERY

- BESSER MFG. CO., Alpena, Mich.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- W. P. HEINEKIN CO., 50 Broad St., New York 3, N.Y.
- KENNEDY VAN SAUN MFG. & ENG. CORP., 2 Park Ave., New York 16, N.Y.
- SINTERING MACHINERY CORP., Box 68, Netcong, N.J.
- F. L. SMIDTH & CO., 11 West 42nd St., New York 36, N.Y.
- STEARNS MFG. CO., INC., Beecher St., Adrian, Mich.

SKIP LOADERS

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BEAUMONT BIRCH CO., 1505 Race St.,, Philadelphia 2, Pa.

- BESSER MFG. CO., Alpena, Mich.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

- DES PLAINES CONCRETE PROD. MACHINERY, 930 North Ave., Des Plaines, Ill.

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.

- LINK-BELT COMPANY, 307 N. Michigan Ave., Chicago 1, Ill.
- STEARNS MFG. CO., INC., Beecher St., Adrian, Mich.
- VULCAN IRON WORKS, 730 So. Main St., Wilkes-Barre, Pa.
- WITTEMANN MACHINERY CO., Farmingdale, N.J.

SKIP HOISTS

ANCHOR CONCRETE MACHINERY CO., 191 Fairview Ave., Columbus 12, Ohio

- J. W. APPLEY & SON, INC., 831 9th St. North, St. Petersburg 2, Fla.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BEAUMONT BIRCH CO., 1505 Race St., Philadelphia 2, Pa.

- BESSER MFG. CO., Alpena, Mich.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.

BROOKS EQUIPMENT & MFG. CO., 2018 Davenport Road S.E., Knoxville 8, Tenn.

CLYDE IRON WORKS, INC., Duluth 1, Minn.

- COLUMBIA MACHINE WORKS, 107 S. Grand Ave., Vancouver, Wash.
- CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
- THE JEFFREY MFG. CO., 935 N. Fourth St., Columbus 16, Ohio
- W. A. JONES FOUNDRY & MACHINE CO., 4401 W. Roosevelt Road, Chicago 24, Ill.
- THE KENT MACHINE CO., 113 E. Portage Trail, Cuyahoga Falls, Ohio
- LINK-BELT COMPANY, 307 N. Michigan Ave., Chicago 1, Ill.
- LITH-I-BAR CO., 54 W. Eighth St., Holland, Mich.

MISHCO CORP., 615 S.W. 2nd Ave., Miami, Fla.

- MULTIPLEX MACHINERY CO., 1430 Fremont St., Elmore, Ohio
- NORDBERG MFG. CO., 3073 S. Chase Ave., Milwaukee 1, Wisc.
- THE GENE OLSEN CORP., 401 Grace St., Adrian, Mich.
- STEARNS MFG. CO., INC., Beecher St., Adrian, Mich.
- THE STEARNS-ROGER MFG. CO., 1720 California St., Denver 2, Colo.
- STEPHENS-ADAMSON MFG. CO., 7 Ridgeway Ave., Aurora, Ill.

SUPERIOR-LIDGERWOOD-MUNDY CORP., 1101 John Ave., Superior, Wis.

SLAKERS (see Hydrators, Lime)

SLINGS, Wire Rope (see Wire Rope Slings)

SLUGS, Grinding (see Grinding Media)

SLURRY AGITATORS

- CONCRETE TRANSPORT MIXER CO., 4985 Fyler Ave., St. Louis 9, Mo.
- DENVER EQUIPMENT CO., 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- THE DORR CO. ENGRS., Barry Place, Stamford, Conn.

THE GALIGHER CO., 545 W. 8th South St., Salt Lake City 4, Utah

- HARDINGE CO., INC., 240 Arch St., York, Pa.
- W. A. RIDDELL CORP., Bucyrus, Ohio
- F. L. SMIDTH & CO., 11 West 42nd St., New York 36, N.Y.
- THE T. L. SMITH CO., 2835 N. 32nd St., Milwaukee 45, Wis.
- WESTERN MACHINERY CO., 760 Folsom St., San Francisco 7, Calif.

SLURRY FILTERS

- DENVER EQUIPMENT CO., 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- THE DORR CO., ENGRS., Barry Place, Stamford, Conn.
- THE EIMCO CORP., P.O. Box 300, Salt Lake City 10, Utah.
- MILLER-KOMLINE CO., P.O. Box 257, Peapack, N.J.

OLIVER UNITED FILTERS, INC., 33 W. 42nd St., New York 36, N.Y.

SLURRY MIXERS

- BARBER-GREENE CO., 400 N. Highland Ave., Aurora, Ill.
- DENVER EQUIPMENT CO., 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- THE DORR CO. ENGRS., Barry Place, Stamford, Conn.
- HARDINGE CO., INC., 240 Arch St., York, Pa.
- KWIK MIX COMPANY, Port Washington, Wisc.
- SEPARATION PROCESS CO., Fuller Building, Catasauqua, Pa.
- F. L. SMIDTH & CO., 11 West 42nd St., New York 36, N.Y.
- THE T. L. SMITH CO., 2835 N. 32nd St., Milwaukee 45, Wisc.
- WESTERN MACHINERY CO., 760 Folsom St., San Francisco 7, Calif.

SLURRY PUMPS (see Pumps, Slurry)

SLURRY SEPARATORS

- DENVER EQUIPMENT CO., 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- THE DORR CO. ENGRS., Barry Place, Stamford, Conn.
- SEPARATION PROCESS CO., Fuller Bldg., Catasauqua, Pa.
- F. L. SMIDTH & CO., 11 West 42nd St., New York 36, N.Y.
- WESTERN MACHINERY CO., 760 Folsom St., San Francisco 7, Calif.

SLURRY THICKENERS

- DENVER EQUIPMENT CO., 1400 17th Street, P.O. Box 5268, Denver 17, Colo.
- THE DORR CO. ENGRS., Barry Place, Stamford, Conn.
- GENERAL AMERICAN TRANSPT. CORP., 139 So. 4th St., Louisville 2, Ky.
- HARDINGE CO., INC., 240 Arch St., York, Pa.
- W. P. HEINEKIN CO., 50 Broad St., New York 3, N.Y.
- LINK-BELT COMPANY, 307 N. Michigan Ave., Chicago 1, Ill.

WM. E. ROBINSON & CO., 3633 Spring Garden St., Philadelphia 4, Pa.

- WESTERN MACHINERY CO., 760 Folsom St., San Francisco 7, Calif.

SOCKETS, Wire Rope (see Wire Rope Fittings)

SPACE HEATERS

- GENERAL ELECTRIC CO., 1 River Road, Schenectady 5, N.Y.
- JACKSON & CHURCH CO., 321 N. Hamilton St., Saginaw, Mich.

PRAT-DANIEL CORP., 2 Meadow St., So. Norwalk, Conn.

YOUNG RADIATOR CO., 709 S. Marquette St., Racine, Wis.

SPEED REDUCERS (see Drives)

SPOUTS (see Chutes)

SPRAY COOLING SYSTEMS

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.

SPRAYS, Wash Water

BETE FOG NOZZLE, INC., 85 Pierce St., Greenfield, Mass.

BINKS MFG. CO., 3114-44 Carroll Ave., Chicago 12, Ill.

- THE DEISTER CONCENTRATOR CO., 901 Glasgow Ave., Fort Wayne 1, Ind.
- DEISTER MACHINE CO., 1933 E. Wayne St., Fort Wayne 4, Ind.

SPROCKETS, Chain

- AMERICAN BRAKE SHOE CO., 230 Park Ave., New York 17, N.Y.
- AMERICAN MANGANESE STEEL DIV. AMERICAN BRAKE SHOE CO., 389 E. 14th St., Chicago Heights, Ill.

THE C. O. BARTLETT AND SNOW CO., 6200 Harvard Ave., Cleveland 5, Ohio

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Cal.

● A dot before name indicates ROCK PRODUCTS Advertiser

DIRECTORY

• **CHAIN BELT COMPANY**, 4649 W. Greenfield Ave., Milwaukee 1, Wisc.

• **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.

DIAMOND CHAIN CO., INC., 402 Kentucky Ave., Indianapolis 7, Ind.

• **DODGE MFG. CORP.**, Mishawaka, Ind.

FORT WORTH STEEL & MACHINERY CO., 3600 McCart St., Fort Worth, Texas

• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.

• **IOWA MFG. CO.**, 916 16th St. NE, Cedar Rapids, Iowa

• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio

• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.

• **McLANAHAN & STONE CORP.**, 200 Wall St., Hollidaysburg, Pa.

MORSE CHAIN CO., 7601 Central Ave., Detroit 8, Mich.

THE TOOL STEEL GEAR & PINION CO., 211 Township Ave., Cincinnati 16, Ohio

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburgh, Kans.

WHITNEY CHAIN CO., 237 Hamilton St., Hartford 6, Conn.

STAIR TREADS & STEPS, Industrial

• **BLAW-KNOX CO.**, P. O. Box 1198, Pittsburgh 30, Pa.

• **HENDRICK MFG. CO.**, Dundaff St., Carbondale, Pa.

• **JOSEPH T. RYERSON & SON, INC.**, P. O. Box 8000-A, Chicago 80, Ill.

• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N.Y.

• **U. S. STEEL SUPPLY DIV. OF UNITED STATES STEEL CO.**, 208 S. LaSalle St., Chicago 4, Ill.

STARTERS, Motor

• **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wisc.

THE ELECTRIC CONTROLLER & MFG. CO., 2700 East 79th Street, Cleveland 4, Ohio

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

STEAM-CURING EQUIPMENT, Concrete (see Kilns)

STEEL

1. **Abrasion Resisting**
2. **Bar**
3. **Concrete Reinforcing**
4. **Heat-Resisting**
5. **Manganese**
6. **Plates & Shapes**
7. **Shafting**
8. **Special Alloy**

ALLIED STEEL & TRACTOR PRODUCTS, INC., 7835 Broadway, Cleveland 5, Ohio
1—2—5—6—7—8

• **AMERICAN BRAKE SHOE CO.**, 230 Park Ave., New York 17, N.Y.
1—4—5—6—8

• **AMERICAN MANGANESE STEEL DIV. AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.
1—5—6

• **ARMCO STEEL CORP.**, 703 Curtis St., Middletown, Ohio
1—2—4—6—8

BETHLEHEM STEEL CO., Third St., Bethlehem, Pa.
1—2—3—4—5—6—7—8

BRUNNER & LAY, INC., 9300 King St., Franklin Park, Ill.
2—8

• **COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.
1—2—3—4—5—6—7—8

• **THE FROG, SWITCH & MFG. CO.**, Carlisle, Pa.
1—5

INLAND STEEL CO., 38 So. Dearborn St., Chicago 3, Ill.
1—2—3—6

ISAACSON IRON WORKS, 2917 E. Marginal Way, Seattle 14, Wash.
7—8

• **JONES & LAUGHLIN STEEL CORP.**, 401 Liberty Ave.-Gateway Center, Pittsburgh 30, Pa.
1—2—3—4—6—7—8

MIR-O-COL ALLOY CO., INC., 340 N. Avenue 21, Los Angeles 31, Calif.
1

• **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.
5

REPUBLIC STEEL CORP., Republic Bldg., Cleveland 1, Ohio
1—2—3—4—5—7—8

• **JOSEPH T. RYERSON & SON, INC.**, P. O. Box 8000-A, Chicago 80, Ill.
1—2—3—4—5—6—7—8

• **SHEFFIELD STEEL CORP.**, Sheffield Station, Kansas City 25, Mo.
1—2—3—4—5—6—8

• **STROH PROCESS STEEL CO.**, 1428 High St. N. S., Pittsburgh 12, Pa.
1

• **STULTZ-SICKLES COMPANY**, 141 Lafayette St., Newark 5, N. J.
2—5—6—8

• **TAYLOR-WHARTON IRON & STEEL CO.**, High Bridge, N. J.
5—8

• **THE TIMKEN ROLLER BEARING CO.**, 1835 Dueber Ave. S.W., Canton 6, Ohio
2—8

• **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.
1—2—3—4—5—6—8

• **U. S. STEEL SUPPLY DIV. OF UNITED STATES STEEL CO.**, 208 S. LaSalle St., Chicago 4, Ill.
1—2—3—4—5—6—7—8

STOKERS, Coal, for Lime Kilns, etc.

ARNOLD & WEIGEL DIV., TOLEDO ENGINEERING CO., INC., 958 Wall St., Toledo 6, Ohio

• **THE BABCOCK & WILCOX CO.**, 85 Liberty St., New York 6, N.Y.

WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S.E., Minneapolis 14, Minn.

FAIRBANKS, MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.

STORAGE SYSTEMS, Radial

• **BARBER-GREENE** 631, Park Ave., Aurora, Ill.

• **ERIE STEEL CONST.**, P. O. Box 1031, Erie Pa.

• **E. LEE HEIDENREICH, JR.**, 75 Second St., Newburgh, N.Y.

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

• **PETTIBONE-MULLIKEN CORP., IMPACT MASTER DIVISION**, 4700 W. Division St., Chicago 51, Ill.

• **ROBINS CONVEYORS DIV., HEWITT-ROBINS, INC.**, 270 Passaic Ave., Passaic, N.J.

• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.

STUCCO COLORS (see Cement and Masonry Colors)

SUPERHEATERS (see Boilers)

SWITCHBOARDS AND PANELS

• **ALLIS-CHALMERS MFG. CO.**, 975 S. 70th St., Milwaukee 1, Wis.

THE BRISTOL CO., Waterbury 20, Conn.

• **ELECTRIC MACHINERY MFG. CO.**, 800 Central Ave., Minneapolis 13, Minn.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

THE HAYS CORP., Michigan City, Ind.

SWITCHES, Control, Electric

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

THE ELECTRIC CONTROLLER & MFG. CO., 2700 East 79th St., Cleveland 4, Ohio

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

• **R. G. LeTOURNEAU, INC.**, 2301 North Adams, Peoria 3, Ill.

WITTEMANN MACHINERY CO., Paynters Rd., Farmingdale, N.J.

SWITCHES, Magnetic

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

THE ELECTRIC CONTROLLER & MFG. CO., 2700 East 79th St., Cleveland 4, Ohio

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N.Y.

• **WITTEMANN MACHINERY CO.**, Farmingdale, N. J.

T

TABLES, Washing, Concentrating (see Concentrating Tables)

TACHOMETERS, Counters, etc.

THE BRISTOL CO., Waterbury 20, Conn.

• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.

THE FOXBORO CO., 38 Neponset Ave., Foxboro, Mass.

• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

RELIANCE ELECTRIC & ENGR. CO., 1058 Ivanhoe Road, Cleveland 10, Ohio

TANKS, Gasoline

WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S.E., Minneapolis 14, Minn.

• **GENERAL AMERICAN TRANSPORTATION CORP.**, 135 So. LaSalle St., Chicago 90, Ill.

LANDIS STEEL CO., 116 West A St., P.O. Box 248, Picher, Okla.

McNAMAR BOILER & TANK CO., 160 No. Rockford, Tulsa, Okla.

YAUN MFG. CO., Box 1508, Baton Rouge, La.

TANKS, Sand Settling (see Sand Recovery Machinery)

TANKS, Storage, Concrete

• **BLAW-KNOX CO.**, P. O. Box 1198, Pittsburgh 30, Pa.

• **E. LEE HEIDENREICH, JR.**, 75 Second St., Newburgh, N. Y.

• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

• **MACDONALD ENGR. CO.**, 188 W. Randolph St., Chicago 1, Ill.

• **THE MARIETTA CONCRETE CORP.**, Westview, Marietta, Ohio

THE NEFF & FRY CO., 150 S. Main St., Camden, Ohio

TANKS, Storage, Steel

ANDERSON ENGINEERING CO., 225-243 Bent St., Cambridge 41, Mass.

BETHLEHEM STEEL CO., Third St., Bethlehem, Pa.

BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Cal.

WM. BROS. BOILER & MFG. CO., 1057 10th Ave. S.E., Minneapolis 14, Minn.

• **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Cal.

• **DIAMOND IRON WORKS, INC.**, 1728 North 2nd Street, Minneapolis 11, Minn.

• **FLEMING MFG. CO.**, 4985 Fyler, St. Louis, Mo.

• **GENERAL AMERICAN TRANSPORTATION CORP.**, 135 So. LaSalle St., Chicago 90, Ill.

• **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio

IRVINGTON FORM & TANK CORP., 20 Vesey St., New York, N. Y.

ISAACSON IRON WORKS, 2917 E. Marginal Way, Seattle 14, Wash.

• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.

McNAMAR BOILER & TANK CO., 160 No. Rockford, Tulsa, Okla.

PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N. Y.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburgh, Kans.

YAUN MFG. CO., Box 1508, Baton Rouge, La.

TESTING LABORATORIES (see Laboratories)

TESTING EQUIPMENT (see Laboratory Apparatus)

THAWING PITS (for Frozen R. R. Hopper Cars)

HAUCK MFG. CO., 137-147 Tenth St., Brooklyn 15, N. Y.

THERMOCOUPLES, Pyrometers (see Pyrometers)

THICKENERS (see Slurry Thickeners)

THIRD AXLES (see Motor Truck Drives and Differentials)

TIRES, Coolers, Dryers, Kiln

• **AMERICAN MANGANESE STEEL DIV. AMERICAN BRAKE SHOE CO.**, 389 E. 14th St., Chicago Heights, Ill.

• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio

• **F. L. SMIDTH & CO.**, 11 West 42nd St., New York 36, N. Y.

UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

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DIRECTORY

• **VULCAN IRON WORKS**, 730 So. Main St., Wilkes-Barre, Pa.

TIRES AND TUBES, Rubber, Heavy Duty Industrial

• **THE FIRESTONE TIRE & RUBBER CO.**, 1200 Firestone Pkway, Akron 17, Ohio
• **B. F. GOODRICH CO.**, Akron 11, Ohio
• **THE GOODYEAR TIRE & RUBBER CO., INC.**, 1144 E. Market St., Akron 16, Ohio
• **UNITED STATES RUBBER CO.**, 1230 Ave. of the Americas, New York 20, N. Y.

TORCHES, Cutting and Welding (see Welding and Cutting Equipment, Oxyacetylene)

TORQUE CONVERTERS

• **ALLISON DIVISION, GENERAL MOTORS**, Box 894, Indianapolis 6, Ind.
• **TORCON CORPORATION**, 493 E. 5th St., Ashtabula, Ohio

TOWERS, Structural Steel

BETHLEHEM STEEL CO., Third St., Bethlehem, Pa.
• **BLAW-KNOX CO.**, P. O. Box 1198, Pittsburgh 30, Pa.
ISAACSON IRON WORKS, 2917 E. Marginal Way, Seattle 14, Wash.

TRACK & TRACK EQUIPMENT

ATHEY PRODUCTS CORP., 5631 W. 65th St., Chicago 38, Ill.
BETHLEHEM STEEL CO., Third St., Bethlehem, Pa.
THE C. S. CARD IRON WKS. CO., P. O. Box 117, Denver 1, Colo.
• **CLIPPER MFG. COMPANY**, 2807 Warwick, Kansas City 8, Mo.
• **COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.
• **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
• **MIDWEST STEEL CORP.**, 514 Dryden St., Charleston 1, W. Va.
PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.
• **UNITED STATES STEEL CORP.**, 525 William Penn Place, Pittsburgh 30, Pa.

TRACTORS, Industrial Crawler

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
• **CATERPILLAR TRACTOR CO.**, Peoria 8, Ill.
HENNEUSE ENG. CO., Marion, Ohio
• **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
• **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill.
• **THE OLIVER CORP.**, 400 W. Madison St., Chicago 6, Ill.

TRAILER BODIES (see Bodies)

TRAILER BODIES, Bulk Cement (see Bodies)

TRAILERS & SEMI-TRAILERS, Motor Truck Eqpt.

• **COOK BROS. EQUIPMENT CO.**, 1815 N. Broadway, Los Angeles 31, Calif.
• **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
• **THE EUCLID ROAD MACHINERY CO.**, 1361 Chardon Road, Cleveland 17, Ohio
GRAMM TRAILER CORP., First Lima Building, Lima, Ohio
THE HANSON CLUTCH & MACHINERY CO., Wall & Miami Sts., Tiffin 15, Ohio
• **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.
• **LANDIS STEEL CO.**, 116 West A St., P.O. Box 248, Picher, Okla.
PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N. Y.
TRAILMOBILE INC., 31st & Robertson Ave., Cincinnati 9, Ohio
TRUCK ENGINEERING CORP., 1285 W. 70th St., Cleveland 2, Ohio
UNITED IRON WORKS CO., 108 No. Locust St., Pittsburg, Kans.

TRAILERS, Cable Dump

• **SCHONROCK EQUIPMENT MFG. CO.**, P.O. Box 1543, San Angelo, Texas

TRAMWAYS, Aerial (see Aerial Tramways)

TRANSFER PLANTS, Ready-Mixed Concrete

• **BLAW-KNOX DIV. OF BLAW-KNOX CO.**, P.O. Box 1198, Pittsburgh 30, Pa.
BODINSON MFG. CO., 2401 Bayshore Blvd., San Francisco 24, Calif.
• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
• **ERIE STEEL CONST.**, P. O. Box 1031, Erie, Pa.
• **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
• **THE C. S. JOHNSON CO.**, P.O. Box 71, Champaign, Ill.

TRANSFORMERS, Electric

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.

TRANSIT CONCRETE MIXING PLANTS (see Central Mixing Plants)

TRANSMISSION MACHINERY (see Gears)

TRIPPERS, Belt (see Conveyor Belt Trippers)

TROLLEYS, I-Beam

CHISHOLM-MOORE HOIST CORP., Fremont Ave., Tonawanda, N. Y.
• **COLORADO FUEL & IRON CORP.**, P. O. Box 1920, Denver 1, Colo.
• **FLEMING MFG. CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
• **JOSEPH T. RYERSON & SON, INC.**, P.O. Box 8000-A, Chicago 80, Ill.
• **U. S. STEEL SUPPLY DIV. OF UNITED STATES STEEL CO.**, 208 S. LaSalle St., Chicago 4, Ill.
WHITING CORPORATION, 157th & Lathrop, Harvey, Ill.

TRUCK BODIES (see Bodies)

TRUCKS, Dump (see Motor Trucks)

TRUCKS, Hand

BARRETT-CRAVENS CO., 4613 S. Western Blvd., Chicago 9, Ill.
• **CONCRETE TRANSPORT MIXER CO.**, 4985 Fyler Ave., St. Louis 9, Mo.
• **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
THE HOWE SCALE CO., Rutland, Vt.
• **KWIK MIX COMPANY**, Port Washington, Wisc.
LIFT TRUCKS, INC., 2425 Spring Grove Ave., Cincinnati 14, Ohio
SERVICE CASTER & TRUCK CORP., Albion, Mich.
STANDARD PRESSED STEEL CO., Jenkintown, Pa.
TWIN TILT TRUCK CO., Fischer Ave., at B&O R.R., Cincinnati 17, Ohio

TRUCKS, Lift (see Lift Trucks)

TRUCKS, Straddle

GERLINGER CARRIER CO., Dallas, Oregon

TRUCKS AND TRACTORS, Wheeled Industrial

1. Electric
2. Gas

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis. 1—2
THE ATLAS CAR & MFG. CO., 1140 Ivanhoe Road, Cleveland 10, Ohio 1
BARRETT-CRAVENS CO., 4613 S. Western Blvd., Chicago 9, Ill. 1
• **THE BUDA COMPANY**, 154th & Commercial, Harvey, Illinois 2
J. I. CASE COMPANY, 700 State Street, Racine, Wisc. 2
• **CLARK EQUIPMENT CO.**, Industrial Truck Div., Springfield Place, Battle Creek 60, Mich. 1
• **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa. 1
• **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill. 2
HYSTER COMPANY, 2918 N.E. Clackamas St., Portland 8, Ore. 2
• **INTERNATIONAL HARVESTER CO.**, 180 N. Michigan Ave., Chicago 1, Ill. 1—2
• **THE KNICKERBOCKER CO.**, 603 Liberty St., Jackson, Mich. 2
LIFT TRUCKS, INC., 2425 Spring Grove Ave., Cincinnati 14, Ohio 1
• **MINNEAPOLIS-MOLINE CO.**, P. O. Box 1050, Minneapolis 1, Minn. 2
THE PRIME-MOVER CO., Muscatine, Iowa 2
REO MOTORS, INC., 1331 S. Washington Ave., Lansing 20, Mich. 2
SERVICE CASTER & TRUCK CORP., Albion, Mich. 2
SILENT HOIST & CRANE CO., 895 63rd St., Brooklyn 20, N. Y. 1—2

TRUCKS, Motor (see Motor Trucks)

TURBINES, Steam

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.
• **GENERAL ELECTRIC CO.**, 1 River Road, Schenectady 5, N. Y.
• **WORTHINGTON CORPORATION**, Worthington Ave., Harrison, N. J.

TURBINES, Water

• **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wisc.

TURNTABLES, Track

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbus 12, Ohio
THE ATLAS CAR & MFG. CO., 1140 Ivanhoe Road, Cleveland 10, Ohio
THE CHASE FOUNDRY & MFG. CO., 2300 Parsons Avenue, Columbus 7, Ohio
• **EASTON CAR & CONSTRUCTION CO.**, Easton, Pa.
• **HARDINGE CO., INC.**, 240 Arch St., York, Pa.
PRESSED STEEL CAR CO., INC., 25 Broad St., New York 4, N.Y.
REVOLVATOR COMPANY, 86th St. at U. S. Rtes. 1 & 9, North Bergen, N. J.
WHITING CORPORATION, 157th & Lathrop, Harvey, Ill.

U

UNLOADERS, Boat

CLYDE IRON WORKS, INC., Duluth 1, Minn.
• **THE EIMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah
• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
• **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
• **WELLMAN ENGINEERING CO.**, 7000 Central Ave., Cleveland 4, Ohio

UNLOADERS, Box Car

• **BARBER-GREENE CO.**, 631 W. Park Ave., Aurora, Ill.
• **BUTLER BIN CO.**, 945 Blackstone Ave., Waukesha, Wisc.
• **THE EIMCO CORP.**, P. O. Box 300, Salt Lake City 10, Utah
• **GEO. HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N. Y.
• **HEWITT-ROBINS, INC.**, 666 Glenbrook Road, Stamford, Conn.
• **THE FRANK G. HOUGH CO.**, 939 Sunnyside Ave., Libertyville, Ill.
• **THE JEFFREY MFG. CO.**, 935 N. Fourth St., Columbus 16, Ohio
• **C. S. JOHNSON CO.**, P. O. Box 71, Champaign, Ill.
• **LINK-BELT COMPANY**, 307 N. Michigan Ave., Chicago 1, Ill.
• **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Miwaukee 14, Wis.
• **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51,
• **STEARNS MAGNETIC, INC.**, 675 S. 28th St., Milwaukee 46, Wis.
• **STEPHENS-ADAMSON MFG. CO.**, 7 Ridgeway Ave., Aurora, Ill.
TRACTOMOTIVE CORP., County Line Road, Deerfield, Ill.

UNLOADERS, Pneumatic

• **FULLER COMPANY**, Catasauqua, Pa.
• **NEW HAVEN VIBRATOR CO.**, 131 Chestnut St., P. O. Box 1669, New Haven 7, Conn.

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DIRECTORY

UNLOADERS, Hopper Car

- **ALLIS-CHALMERS MFG. CO.**, 975 So. 70th St., Milwaukee 1, Wis.

ANCHOR CONCRETE MACHINERY CO., 1191 Fairview Ave., Columbut 12, Ohio

- **BARBER-GREENE CO.**, 400 N. Highland Ave., Aurora, Ill.
- **BAUGHMAN MFG. CO., INC.**, Shipman Road, Jerseyville, Ill.
- **CONTINENTAL GIN CO.**, 4500 5th Ave. S., Birmingham, Ala.

THE CONVEYOR CO., 3260 E. Slauson Ave., Los Angeles 58, Calif.

- **A. B. FARQUHAR CO.**, 142 N. Duke St., York, Pa.

GODFREY CONVEYOR CO., Wolfe & 13th Sts., Elkhart, Ind.

- **GEO HAISS MFG. CO., INC.**, Div. Pettibone Mulliken Corp., 350 Fifth Ave., New York 1, N. Y.
- **THE HELTZEL STEEL FORM & IRON CO.**, Warren, Ohio
- **HEWITT-ROBINS INC.**, 666 Glenbrook Road, Stamford, Conn.
- **C. S. JOHNSON CO.**, P. O. Box 71, Champaign. Ill.
- **THE KENT MACHINE CO.**, 113 E. Portage Trail, Cuyahoga Falls, Ohio
- **LIPPMANN ENGINEERING WORKS**, 4603 W. Mitchell St., Milwaukee 14, Wis.
- **NEW HAVEN VIBRATOR CO.**, 131 Chestnut St., P. O. Box 1669, New Haven 7, Conn.
- **THE OLIVER CORP.**, 400 W. Madison St., Chicago 6, Ill.
- **PETTIBONE MULLIKEN CORP.**, 4700 W. Division St., Chicago 51, Ill.

VIBRO-PLUS PRODUCTS, INC., 54-11 Queens Blvd., Woodside 77, N. Y.

V

VACUUM CLEANING SYSTEMS

THE SPENCER TURBINE CO., 486 New Park Ave., Hartford 6, Conn.

UNITED STATES HOFFMAN MACHINERY CORP., 105 Fourth Ave., New York 3, N. Y.

VALVES, Air

THE BRISTOL CO., Waterbury 20, Conn.

- **CANNON VIBRATOR CO., DIV. THE BERKSHIRE MFG. CO.**, 1111 Power Ave., Cleveland 14, Ohio

DIXON VALVE & COUPLING CO., Hancock St. & Columbia Ave., Philadelphia 22, Pa.

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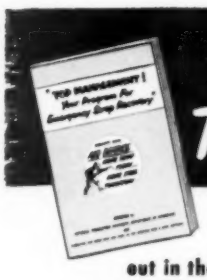

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ALDEN G. ROACH

President, Columbia-Geneva Steel Division and Consolidated Western Steel Division, United States Steel Corporation

"It is most gratifying to me that the employees of the Columbia-Geneva Steel Division and the Consolidated Western Steel Division of United States Steel Corporation have accorded meaning to their belief that the security of our nation rests upon our cooperative effort. The enthusiastic response of our employees made me doubly glad we conducted a person-to-person canvass for the Payroll Savings Plan for U. S. Defense Bonds."

The experience of Columbia-Geneva and Consolidated Western Divisions of United States Steel Corporation is not an isolated one.

Since January 1, 1951, hundreds and hundreds of companies have conducted person-to-person canvasses of their plants and offices. In every instance, employee participation in the Payroll Savings Plan has increased—sometimes from a low figure—to 60, 70, 80%. In a number of plants, participation passed the 90% mark.

The explanation is simple.

Employees *want* to provide for their future security.

Given an opportunity to enroll in the Payroll Savings Plan they respond immediately—as evidenced by the fact that more than 2,000,000 men and women have joined the Payroll Savings Plan since January 1, 1951.

The monthly take-home savings of the 7,500,000 now in the Payroll Savings Plan totals $150,000,000 per month—and growing rapidly.

As a step toward *your* personal security, and the security of your associates, bring this page to the attention of your top executive. Tell him that—

- a person-to-person canvass of your plant can be conducted without pressure, prize awards or other stimulation. (In many plants, employee organizations have undertaken the actual distribution of Payroll Savings Application Blanks.)
- The Savings Bond Division, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C., will gladly help your company with suggestions, posters, envelope stuffers and other aids.

The U. S. Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America.

CLASSIFIED ADVERTISEMENTS

Special Crushers ! !

Raymond High Side 4 roll Pulverizer, No. 8047
Pennsylvania C-4-30 Reversible Hammermill.
Cedar Rapids 4033 Hammermill. Diesel powered.
Raymond No. 412 bowl pulverizer mill.
FARREL BACON 36" x 48" Jaw Crusher.
Dixie No. 3640 Premier Non-clogging Hammermill.

DREDGES

Elliott 12"x10" new pump with new V-12 385 HP Diesel engine. Port. steel hull.
Elliott 8" with cutter. Diesel Hull 48'x18'x3'6".
8" Hydraulic, Diesel. On 32'x8' steel pontoons.
Amsco 10" Diesel power portable. Excellent.
6" portable Diesel complete with cutters, etc.
8" H-P twin Diesel drive. Complete.
Port. Erie Strayer concrete plant 30-40 TPH

CONCRETE PLANTS AND EQUIPMENT

3 Koehring 4 yd. tilting mixers complete.
Smith 56-S two yard tilting mixer. Complete.
Erie 3 compt. 100 ton agg. bin 400 bbl. cement batcher
400 bbl. reserve silo. New 1950. Excellent.
Large plant 212 yd 6 compts. agg. & cement elevators, 56-S Mixer.
Large plant 400 yds 5 compts. two mixers
NEW F-S 100 ton agg. bin 3 compt.
NEW F-S 400 bbl. cement bin complete.

CRUSHING PLANTS

Cedar Rapids 10x36 Portable Diesel power
Pioneer 40-V. New 1946. Portable. Diesel power
Pioneer Portable 24x36 Diesel power.
Telsmith Primary Port. 25"x36" jaw crusher Diesel
Pioneer Secondary Plant. Port. 100 T.P.H. 1¾".

CRUSHERS

JAW: Acme 10x20, 14x26, 14x28, 10x42, 16x32, 18x32, 25x40. Eagle 20x36. Diamond 24x36".
Cedar Rapids 10x20, 20x36, 25x40. Farrell 10x20. 13x30, 14x26, 18x36, 36x48. Buchanan 36x42.
Good Roads Reliance 15x30. Traylor 18x36, 24x36. Allis-Chalmers 30x18. Good Roads 10x30. Telsmith 18x32. Champion 1630, 1040, 1236, 1530
GYRATORY: Allis-Chalmers-McCully, 6", 7½", 8", 9", 12K, 20", 30", 42", 14", Newhouse, 24", 36", Gyrasphere, 18", 28". Intercone Telsmith, Telsmith 5H, 10 H, 13 H, 16 H. Kennedy Van Saun 7, 10, 25¼-S, 37. Traylor Ty 1'8". Ty 3'4", T-4½".
ROLL: Allis-Chalmers 54x24. Diamond 40x22. Pioneer 30x18. Telsmith 24x16. Pioneer 30"x18". New Holland 24x16.
HAMMERMILL: Size 4 Williams Jumbo, Pennsylvania SS2, 22x22. Cedar Rapids 20x33. Jeffrey 36x42. Jeffrey 36x24, 36x40. Dixie 3650.
BALL MILL: Allis-Chalmers 4'x4', 5'6"x18'. Kennedy Van Saun 7'x5'. New 4'x4'. Hardinge 6'x4'; Colorado Iron Works 5'x6'; Marcy No. 64½. Hardinge conical 10'x36".
ROD MILL: March 2'x8', 3'x6'. Allis-Chalmers 4'x8'. Hardinge No. 6 208. Marcy 8'x12'. Hardinge 8'x22"
CONE: Symons 2' coarse bowl, 3' standard head.
TUBE MILL: Smith 16ft 5 6"x20', Denver 3'x8".
DRIERS: McNeil 5'x50'. Hardinge 90"x60'. Cummer 66"x50'. Perkins 8'x70'. 10'x90'.

SHOVELS—CRANES—DRAGLINES

N-W 80-D 2½ yd. Dragline. Diesel. 100' boom.
N-W Model 6, 1¼ yd. Diesel Shovel.
Lima Mod. 34, 1 yd. Shovel-Crane-Dragline. Gas.
Link-Belt K-375 2 yd. Diesel Dragline.
Northwest 80-D Diesel Shovel 2½ yd. Recond.
Link Belt K580 Shovel. 1948—practically new.
P&H Model 855, 2 yd. Diesel Shovel.
Bay City 45 Shovel-Backhoe-Crane. Diesel.
Lima 1201, 2½ yd. Diesel Shovel.
Lorain L80 Shovel. 1¾ yd. complete overhaul.
Link Belt K-595 dragline, 2½ yd., 8 ft. boom.
Lima 802, Shovel-Crane-Drag. 2 yd. Diesel.
Koehring ¾ yd. Diesel Shovel.

SCREENS AND FEEDERS

A-C 5'x14' double deck Riple-Flo screen
Symons 4'x14' double deck
Telsmith Vibro-King 3 deck 4'x12' Screen
Acme 5'x12' Revolv. Scrub-Scalp Screen.
A-C 5'x14' 2 deck riple-flo.
Link-Belt 6'x20' revol. Screen. Anti-friction bear.
Traylor Apron Feeder 8'x15', heavy duty.
Telsmith 4'x7' recip. plate feeder

TRAXCAVATORS—PAYLOADERS

Cat. D7 Traxcavator. Rebuilt.
Cat. D6 Traxcavator. Rebuilt.
Cat. D4 Traxcavator. Rebuilt.
Cat. D2 Tractor 50" Traxcavator. Rebuilt.

LOCOMOTIVES

45 ton G.E. Diesel Elec. Loco. std. ga.
25 ton Plymouth gas loco. std. ga.
12 ton Plymouth gas loco. std. ga.
8 ton Plymouth gas loco. std. ga.
25 ton Vulcan steam std. ga. Side tank.
15 ton Whitcomb 36" ga. gas.
12 ton Whitcomb 36" ga. gas.

DERRICKS

American Terry 20 ton Guy Derrick 100' bm.
Clyde 30 ton stiff leg 90 ft. boom
Guy Derrick 15 tons 113' mast 105' boom
American 25 ton stiff leg derrick 90' boom.
Special 35 ton stiff leg derrick 100' boom
Nat'l. Bridge 30 ton Guy Derrick 100 ft.
American 30 ton stiff leg 100' boom.

ASPHALT PLANTS

Butler 100 yd. Bitu. Concrete plant.
Cedarapids 60"x24' asphalt plant drier. Compl.
Madsen 4000# complete plant Diesel powered.
Model S-100 Simplicity. Diesel powered.
Hetherington-Berner Moto-Paver
McCarter complete plant 3000# capacity.
Cedar Rapids Model F'A portable plant.
Cummer Semi-Port. ¾ ton Pugmill.

CABLEWAYS

Sauerman slack line 1¼ yd.; electric 90' mast.
Sauerman 4 yd. complete 200 HP motor-controls
Sauerman 1½ yd. 162' boom 90 HP elec. hoist.
Sauerman 1 yd. with Waukesha gas hoist.

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30 Church St. New York, N. Y.
Cortland 7-0723 Cable: RICHWALSH

30" belt conveyor equipment with belt for 500'
42" belt conveyor equipment for 200'
36" belt conveyor equipment for 350'
New anti friction idlers for 14", 16", 18", and 24" belt
20" flat belt conveyor equipment for 250'
Merrick conveyor scales for 16" and 30" belt
Conveyor belt from 12" to 36" wide
Enclosed 14" wide ceiling conveyor, flat belt
Enclosed 10", 12", 14" and 16" bucket elevators
Open spaced chain and belt bucket elevators, 6" to 16"
Continuous 20" bucket elevator 56' center
Spaced 16" bucket elevator up to 95' center
Continuous belt or chain elevators, 12", 14", 16" buckets
Spaced 6" stainless steel buckets on belt, 45°
Motors, gear reducers, engines, gears, v belt drives
Selectro single deck 4'x6' vibrating enclosed screen
Robins "GYREX" double deck 4'x8' vibrating screens
Symons double deck 42" x 14' vibrating screen
Simplicity single deck 6'x8' heavy scalping screen
Four new Universal vibrating screens
Ing. Rand 5 hp. Double drum electric hoist
Sullivan HE 7½ hp. portable electric hoist
Overhead electric and air hoists
Revolving dryers 3' x 17' and 5' x 50'
Apron conveyors, 24" x 46' and 30" x 30'
Climax jaw crusher 10"x16"
Power & Mining double roll crusher 24" dia. 14" face
New Holland 3-G gear driven 4 roll crusher
Double roll cinder crusher, 12" dia., 16" face
Pa. hammermill SXT-8 with 125 hp. slip ring motor
Stedman B-30 hammermill, 30"x24"
Jeffrey type A anti friction swing hammer pulverizer
Gruendler 2XA anti friction ring pulverizer
Jeffrey single roll coal crusher, 24"x24"
Mead-Morrison single roll coal crusher 24"x30"
Bonnot double roll crusher 24" dia. 30" face
Robins double roll crusher 18" dia. 24" face
40 hp. Alternator 115 volts, 450 volts, 3 phase 31.3 KVA

G. A. UNVERZAGT & SONS
136 Colt St., Irvington, N. J.

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28 SURPLUS NEW BELT CONVEYORS

36 INCH 1-160'—2-250'—1-320'—1-400'—1-590'—2-1000' & 1-1600' Long.
42 INCH 1-144'—1-290'—1-377'—1-575'—2-700'—1-900'—2-1500' Long.

EXTRA IDLERS, TERMINALS & BELTS.

10 SURPLUS NEW MERRICK E WEIGHTOMETERS

1 for 24 In. 8 for 30 or 36 In.
1 for 42 In. Belt

CLYDE HYDRATOR WITH KUNTZ CONTINUOUS DUSTLESS SYSTEM, 4-5 T.P.H.
NO. 1 RAYMOND AUTO PULVERIZER WITH THROWOUT, SEPARATOR & CYCLONE.
KUNTZ 5 x 20 CONTINUOUS HYDRATOR.
NO. 4 CLYDE BATCH HYDRATOR.
3 ROLL BRADLEY HERCULES JR. PULVERIZER.

ROTARY KILNS OR DRYERS

1—4'x20', 2—4'x45', 1—4'x60'
1—6'x60', 2—5½'x7'x60'

LOCOMOTIVES

9—4 TON AND 8 TON GOODMAN, 36 IN., GAUGE BATTERY LOCOMOTIVES.
65 TON G.E. DIESEL ELEC.
10 TON DAVENPORT GAS.
20 TON WHITCOMB GAS.
6 TON BROOKVILLE DIESEL.
2 100 TON G.E. DIESEL ELEC.
4 TON BROOKVILLE GAS.

LOCOMOTIVE CRANES

30 TON INDUSTRIAL GAS.
20 TON ORTON GASOLENE.
25 TON INDUSTRIAL STEAM.

CRUSHERS

48 x 60 SUPERIOR JAW CRUSHER.
24 x 36 FARRELL JAW CRUSHER.
42 x 48 SUPERIOR JAW CRUSHER.
18 x 36 FARRELL JAW CRUSHER.
530R ALLIS CHALMERS FINE REDUCTION.
3 PT. TY TRAYLOR FINE REDUCTION.

MODERN ELEC. AIR COMPRESSORS

1760 FT. INGERSOLL RAND PRE-2, 2300 V.
1302 FT. SULLIVAN WN-31, 220 V.
1302 FT. INGERSOLL RAND, 2300 V.
690 FT. WORTHINGTON, 220 V.

BLAST HOLE DRILLS

5—B. E. 29T ELECTRIC.
1—BUCYRUS ARMSTRONG 12 BIT DRESSER

THE DARIEN CORP.
60 E. 42nd St., N. Y. 17, N.Y.

CRUSHERS: Gyratory 30", 36", 42", and 48". Nos. 12, 10, 9, 7½, 6, 5 Allis-Chal. and others.
JAW TYPE: 24x36, 25x40, 28x36, 40x48, etc.
CONE TY: Symons 2, 3, 4 and 5½'. No. 36 Telsmith. Also Kennedy 19, 25, 37 and 49. Traylor 1'8" and 2'6" TT. Newhouse 7, 10 and 14". Steadman 24, 30 and 36" Impact. Allis-Chalmers Ty. R.
ROLLS: Allis-Chal. 72x30, 54x24, 54x20, 40x15 and 18x10. Pioneer 18x30. Universal 16x24. New Holland 24x16 and 16x16. McLanahan 18x24 and 18x30.
HAMMERMILLS: Williams Nos. 2, 3, 4 and 6. Day Nos. 40 and 70. Gruendler 2XB and 3XB. Dixie 2040, 3650 and 5040, and others.
MILLS: Hardinge 3'x8", 6'x22", 6'x3' and 8'x4'. Kennedy 4x8, 5x8, 5x11. Marcy 4x5, 6x4, 7x16. Raymonds, Sturtevants and others.
CRUSHING PLANTS: 24x36, 25x40, 30x42 and smaller. Also complete stationary plants.
DRYERS: 90"x60', 7'x50', 10'x90', 8'x50'. Etc.
SCREENING PLANT: Large modern plant new in 1946, priced at ⅓ original cost.
DRAGLINES: Page 8 yd. 160' Bm.; Page 6 yd. 125' Bm.; 5W Monighan 5 and 7 Yd. 125'.
BINS & BATCHERS: 20 yd. capacity & larger.

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Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryer, Derricks, Elevators, Excavators, Generators, Hoists, Kiln, Draglines, Drag Scrapers, Dredges, Drills, Engines, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

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Welded
Seamless
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Supplies of Fittings
Valves and Tube Turns
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SPEED-LAY Pipe System
Quick Assembly
Economical, Light Weight
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PIPE SUPPLY CO., INC.
Berry at North 13th Sts., Brooklyn 11, N. Y.
Phone EVergreen 7-8100

FOR SALE

2—EUCLID, Model 9 FDT Tractors with 58 W Bottom Dump Trailers — CUMMINS DIESELS, Excellent Condition, and Excellent Rubber.

2—LINK-BELT 20' x 6' REVOLVING SCREENS

WINTER BROTHERS MATERIAL CO., INC.
VI 3-4052 Sappington 23, Missouri

FOR SALE

1—Acme #8½A Jaw Crusher, 9x16, 20 HP motor
1—Hardinge Conical Ball Mill 4'6" dia. x 24"
2—Williams #1 Hammer Mills
1—Rotary Hot Air Dryer 46" dia. x 26' L
2—Westinghouse Transformers, 100 KVA & 150 KVA
15—15,200 gal. Horiz. Welded Steel Tanks (Virginia)
26—12,700 gal. Horiz. Welded Steel Tanks (Indiana)
22—8,300 gal. Open top Rectang. Welded Steel Tanks 16'10" L x 7'7" W x 8'9" H. (Indiana)
47—Vertical Closed Wood Tanks — 3700, 7000, 8000, 8300 and 10,000 gal. sizes. (Ohio)

PERRY EQUIPMENT CORP.
1418 N. 6th Street, Phila. 22, Pa.

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CLASSIFIED ADVERTISING IN CONCRETE PRODUCTS SECTION

Equipment Values!

THESE PRICES EFFECTIVE JANUARY 1st

COMPRESSOR—Gardner-Denver 500 ft., Serial #154230, powered by D13000 Diesel engine, mounted on 4 pneumatic tires. Less than two years old and is in first-class condition. Special price, FOB Louisville..... **$7,950.00**

TRACTOR-DOZER—Cat Diesel D8, serial #2U-13548, equipped with Cat #25 rear CCU and 8A angledozer. No expense spared in rebuilding this tractor which is fully guaranteed. Sells new for $22,346.00, but our price, FOB Louisville..... **$17,877.00**

COMPRESSOR—Gardner-Denver 365 ft., serial #154820, powered by Cat D8800 Diesel engine, mounted on four pneumatic tires. This almost-new unit has been used very little, but is priced low at, FOB Paducah..... **$6,750.00**

TRACTOR-DOZER—Diesel D7, serial #3T16625, equipped with Caterpillar 7A angledozer and #24 cable control unit. Completely rebuilt in our shop and guaranteed. This tractor is priced at a real bargain value, FOB Louisville..... **$13,151.00**

COMPRESSOR—Gardner-Denver 500 ft., serial #158144, mounted on 4 pneumatic tires, and powered by Cat D13000 Diesel engine. Only one year old. This unit would sell for $13,000.00 new, but our extra special price, FOB Evansville, is..... **$8,950.00**

TRACTOR-DOZER—Caterpillar Diesel D8, serial #2U14871. Completely rebuilt and guaranteed. Equipped with Cat 8S straight dozer and #25 rear CCU. Hourmeter shows only 1249 hours of use. Priced way below new. FOB Louisville..... **$17,345.00**

ROY C.
WHAYNE
SUPPLY CO.
800 W. MAIN ST., LOUISVILLE, KY.
EVANSVILLE, IND. PADUCAH, KY. ASHLAND, KY.

#880 Jr. Gravelmaster & CR 2 unit 100 TPH Crushing, 75 TPH Washing PLANTS.
CRUSHERS: 21/2x3, 9x16, 10x16, 15x36, 18x24, 20x36, 24x36, 30x42 & 48x36 JAW. #25 & 37 Kennedy, 13B & 16B Telsmith, #14 & 16 Mccully, 14" Newhouse GYR. 24x36 sgl. roll. 40x22 dbl. roll. 2' Symons CONE.
70" x 40', 6 x 25 & 7 x 52' Rotary DRYERS.
Log Washers: Eagle 7x30 & 2 Link Belt 24"x18'.
MILLS: Williams 4 & 5. Gruendler 2XC, 3XB, #3 Univ., #22 Gilson, Hammer, Williams Comet Roll. 6x6 & 6x8 Ball. 5x10 Rod.
DRAGLINES: NW25, 6 & 8. Link Belt 370. Monighan 3T.
SHOVELS: Bay City 25, Koehring 251, Buckeye 70, NW25 & 6. Manitowoc 3500. NW78 & 80D. Bucyrus 54B & 80B.
Dorr Thickener: 4 comp. 40' dia. x 30' high 3 tray.
H&B PA20 all elec. 2000# Asphalt Plant.
LOCO. CRANE: 20 ton Brownhoist 8 wheel, Steam.
400 HP GE Slip Ring Motor 390 RPM 440V.

MID-CONTINENT EQUIPMENT CO., INC.
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1—10" x 20"—#4½ Champion Jaw Crusher—Rebuilt.
1—9" x 15"—#4 Champion Jaw Crusher—Rebuilt.
1—1030 Good Roads Overhead Eccentric Crusher.
1—6" x 9" New Holland Jaw Crusher.
1—New Holland 10" x 16"—4 Roll Crusher.
1—20" x 10" New Holland Swing Hammer Pulverizer.
1—Kent-Maxecon #7 Ball Bearing Ring Roll Mill & Vee Belt Drive.

We build open & totally enclosed bucket elevators & belt conveyors to suit your needs.

Large stock chain, sprockets, buckets & conveyor pulleys—new & used.

JOHNSON & HOEHLER, INC.
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FOR SALE

Belt conveyor, 18" wide, on steel frame. Manufactured by S. A. Manufacturing Co., Aurora, Ill. Has 125' centers, with slack adjuster, troughing idlers, return idlers, and drive. Also one belt conveyor with 18" rubber belt. Has 21'4" centers with troughing idlers and drive. Mounted on steel frame.

KLATZKY BROTHERS, INC.
Calumet, Michigan

STOCK SPECIALS

1—P&H Model 855 Crawler Shovel, 2 yd., capacity Diesel power, late model. Crane boom available.

1—P&H Model 700, 1½ yd. Crawler Crane, 50 ft. boom, Gas power. Good Condition.

1—Marion Model 342 Crawler Shovel-Crane 1 yd. capacity Diesel Power. Good all-around condition.

1—Osgood, 1 yd. Crawler Hoe & Crane, 50' boom, Gas powered. Good Condition.

1—Bay City Model 45, ¾ yd. Crawler Shovel or Hoe, Gas power. Completely Rebuilt. Late model.

1—Bay City Model 45, ¾ yd. Crawler Shovel or Hoe. Diesel power. Late model in perfect condition.

1—Buckeye Model 70, ¾ yd. Crawler Hoe & Shovel. Late model, Diesel power.

1—Byers, Model 83, ¾ yd. Crawler Hoe or Crane, gasoline power. Rebuilt.

1—Bay City Model 30 Heavy duty Crawler Shovel or Hoe ½ yd. capacity. Reconditioned.

1—Bay City Model 25, ½ yd. Crawler Hoe-Shovel, Gas Power. Good All Around Condition.

1—Michigan C-16 Crawler Shovel, ½ yd. Gas power. Late Model in first class shape.

1—Bay City Tractor Shovel, Hoe or Crane, "Pup" ¾ yd., ¾ swing, Crawler mounted, gasoline driven.

1—Browning Model E Truck Mounted Crane, 10 Ton capacity powered by diesel engine and mounted on 10 wheel late Model Mack truck. Reconditioned.

1—D-7 Crawler Tractor, 7M series with cable blade, DDPCU. Good running condition.

1—P&H 255A Hoe Attachment, Clamshell Buckets, ¾ to 2 cu. yd., also several Crane Booms—Trench Hoes and Shovel Attachments. Assorted makes.

Check on what you may require.

Eugene P. Reading, Inc.
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RAILS NEW RELAYING

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MIDWEST STEEL CORPORATION
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860 acres of first grade Colorado pink flagstone quarry land. Ideal location, partially developed primarily suited for producing building strips and flagstone for walls and patios. Unlimited nation wide market. Write or Phone:

CHUCK TRIBBLE, Jamestown Star Route, Boulder, Colorado. Ph: Boulder 068-J12.

IT'S THE COMPANY BEHIND THE MACHINE THAT COUNTS

Our 35th Year

ROTARY KILNS:

4—7'x60', ⅜" shells, Timken bearing supporting rolls, firing hoods, gear reducer and motor drives.

3—6'x60' Bonnot Co., complete, ½" shells, each with or without 3'x50' Rotary Cooler. By installing lifting flights these kilns would make excellent heavy duty dryers.

1—7'x45' Link Belt Kiln, complete.

1—4'6"x35' Ruggles-Coles Kiln.

ROTARY DRYERS:

1—8'x54' Struthers-Wells, Timken roller bearing supports, gear reducer, 40 H.P. motor, furnace, burner, etc.

8—6' x 42', 5' x 40' Ruggles-Coles; 54" x 25' Class XF-4 Ruggles-Coles, also Link-Belt 2'7"x10', 6'4"x24' Roto-Louvre.

3—3'x50', 5x30', 5x50', 6x60', 7x70' Direct Heat. Also 3—6'x50' Louisville Rotary Steam Tube.

CRUSHERS:

Jaw—2"x6", 6"x15" Sturtevant; 18x36" and 24x36" Farrel; 42x48" Traylor.

Rolls: 42"x16" Allis-Chalmers Type B; 24x32" Penna. single roll.

Portable Plants—Cedar Rapids 1036-BBB; 2540-AAAA, 2036-AAA, also Pioneer with 30x42" primary and secondary crushers, all Diesel driven.

PULVERIZERS:

1—5 roll Raymond High Side.

6—#1, #0, #00, #000 Raymond Mills.

3—#0, #00, 8" Raymond Screen Mills.

2—#51 Raymond Imp Mills.

2—Mikro #2TH, #4TH.

BALL AND TUBE MILLS:

1—4'6"x7' Allis-Chalmers Ball Granulator, iron lined, used 100 hours.

6—Hardinge Mills, 3'x8", 5'x22", 6'x22", 8'x48".

4—Tube Grinding Mills, made by Traylor E. & M. Co., Allentown, Pa. Silex lined, 4'6"x18'6", 5'x22'. Also 2—5'6"x20' iron lined, with motors.

8—Pebble Mills, porcelain lined; 3—6' dia. x8', 800 gals. each. 1—6'x5', 3—5'x4', each with ball charge.

AIR SEPARATORS:

2—Raymond 6' and 16' dia., 1—8' Gayco; 1—16' Sturtevant.

VIBRATING SCREENS:

3—Selectro 3'x6' 2-deck; 1—3'x6' 1-deck, all totally enclosed, heavy duty.

1—3'x6' Colorado Iron Works, 1-deck.

1—4'x10' Tyler Niagara, 2-decks.

8—Tyler Hummer, 3'x5', 4'x5', 4'x10'. Also #38 4'x10'.

DORR CLASSIFIERS:

2—2 stage Washing Classifiers, each with two rakes in tandem, in steel trough 26'x6" long x 3' wide, with drives.

1—6'x14' Hardinge Rotary Counter Current Classifier, also used for dewatering and scrubbing.

Also Shovels, Cranes, Draglines; Jaw, Gyratory and other Crushers; Symons and Telsmith Cones; Complete Poratable Crushing Plants; Rotary Kilns and Coolers; Air Compressors; Conveyors; AND FULL LINE OF CHEMICAL PROCESS EQUIPMENT.

CONSOLIDATED PRODUCTS COMPANY, INC.
15-16-17 Park Row, New York 38, N.Y.
BArclay 7-0600

LIMA 802 Dragline, Diesel Powered, 70' boom, Long wide Swamp tracks, Rebuilt fall of 1951 and used very little since. $24,500.

NORTHWEST #6 Shovel, ser. no. 5817, D-13000 Cat. power, 1½ cu. yd. Amsco bucket, Rebuilt in winter of 1950 and has had little service since. $16,500.

CRUSHING PLANTS

PIONEER 32x40 Jaw Primary, w/Cummins HRP600 Diesel power, 42x14' grizzly type apron feeder, under crusher conveyor, by-pass chute, etc. 95% new. With power $19,000, without power $15,500.

PIONEER 39V Portable Gravel Plant w/10x36 r.b. Jaw Crusher, 30x18 Double Rolls, 3x10 triple screen, conveyors, 50' feed conveyor Caterpillar D13000 power unit, mounted twelve pneumatic tires. Rebuilt $21,000.

DIXIE 36x50 Portable Hammermill Plant w/-24"x40' undercrusher conveyor, mounted on pneumatic tires. New shaft & bearings in hammermill. $4,500.

CEDAR RAPIDS portable 30x22 Double Roll, r.b., w/4x10 double deck screen, 24" feed conveyor, 24" return conveyor, 12" fines conveyor, 24" rock conveyor. $11,500.

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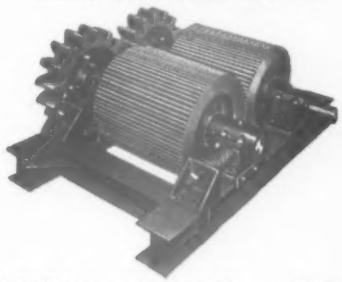

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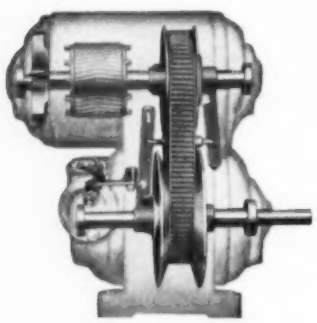

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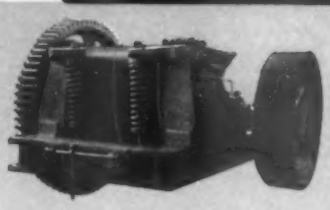
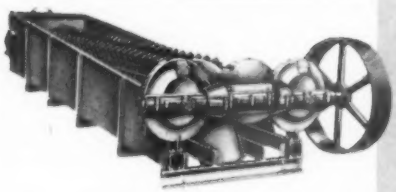
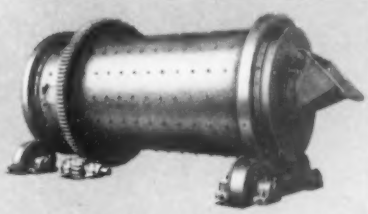


All Steel Rockmaster Single Roll Crusher for primary or secondary work on shovel loaded rock and ore.

A pioneer in the development of many types of processing equipment, McLanahan has served domestic and foreign pits, mines and quarries for more than a century. Shown on this page are a few illustrations of McLanahan equipment for crushing, washing, sizing and conveying all types of ore, coal and rock. Technical details and price information will be sent upon request.

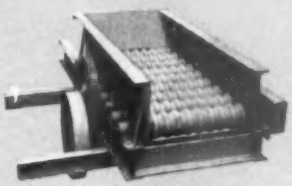


Log Washer for removing tough clay and soft rock from various materials.



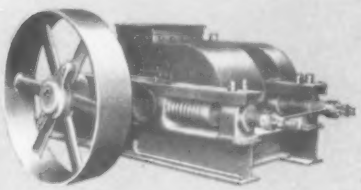
Steel Paddle Mill Scrubber—high capacity for cleaning large size feed.

Heavy Duty Reciprocating Plate Feeder. Handles any material from sand sizes to shovel loaded rock and ore.

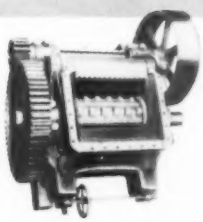


Live roll Grizzly for sizing and feeding various products.

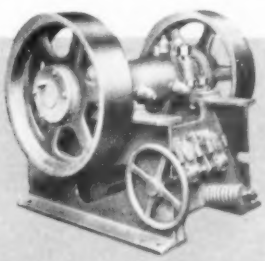
Double duty combination Scrubber and Sizing Screen for large and small capacities.



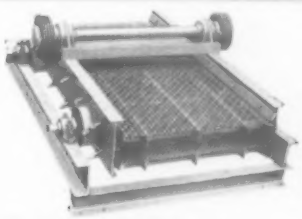
Heavy Duty Fabricated Block Diamond Double Roll Crusher for secondary reduction.



Automatic Steelstrut Crusher for primary and secondary work in small plants.



Fabricated Jaw Crusher for primary and secondary work.



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